

Founded in 1832

RAILWAY LOCOMOTIVES AND CARS

formerly

Mechanical and
Electrical Engineers

JULY 1955

One of Five Specialized Railway Age Publications

W.H. MINER, INC.
CLASS F.R.-16
APPROVED A.A.R.

PATENTS PENDING

W.H. MINER

RUBBER DRIVE GEAR

SECTIONAL VIEW

100, H. MINER, INC. 1955

HOW MANY STEPS IN THE LIFE OF A BRAKE BEAM?



The railroads use millions of time-consuming, money-wasting steps each year carrying freight car brake beams into reclamation plants for dismantling and reassembling—then back again to the stores department.

Truslock cuts the number of those steps right in half!

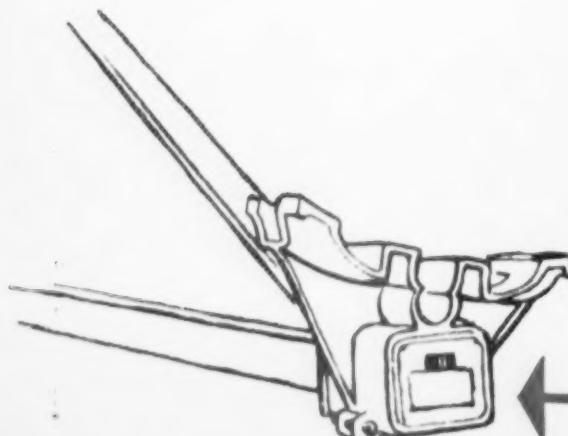
Here's why—

Worn or damaged brake heads account for at least half of the brake beams coming into reclamation plants. It stands to reason that a brake beam equipped with a quick-change brake head—replaceable in a jiffy without special tools or the need to disassemble the brake beam—will cut your reclamation costs by fifty percent.

Economical maintenance is only one of the many TRUSLOCK features that have sold this premium brake beam to 72 railroads and private car lines.

YOUR FIRST BRAKE HEAD CHANGE ON A TRUSLOCK WILL SAVE YOU MORE THAN THE SMALL PREMIUM YOU PAY FOR THIS TOP-PERFORMANCE BRAKE BEAM . . . MAKES TRUSLOCK THE LOWEST COST NO. 18 BRAKE BEAM YOU CAN BUY.

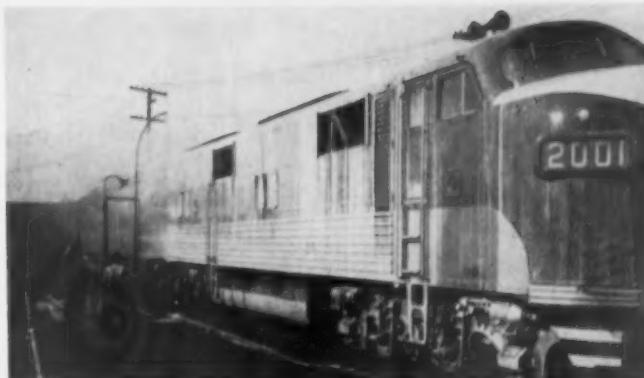
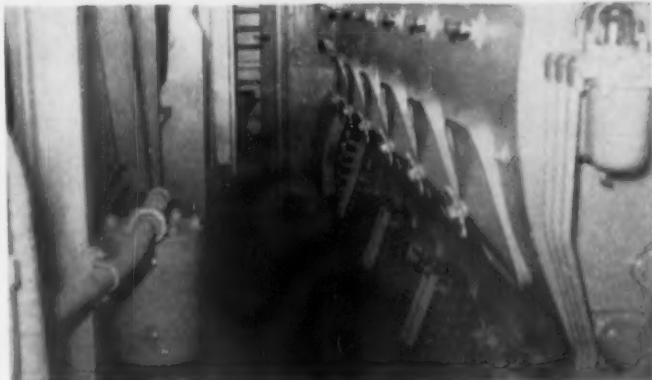
BUFFALO BRAKE BEAM COMPANY
NEW YORK • BUFFALO



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The Buffalo Brake Beam with the
Quick-Change Brake Head

fine, new
water-mixed
material
cleans
diesel engine rooms
and diesel exteriors
quickly, safely



OAKITE COMPOSITION No. 72 will definitely give you faster, better, safer cleaning results. What's more with this **ONE** cleaner you can clean diesel engine rooms and diesel exteriors. You can't help but save money with this double-purpose cleaner Oakite Composition No. 72.

Hear what satisfied users are saying about Oakite Composition No. 72:

"This material is the one we've been looking for...that can be used with water instead of fuel oil or kerosene" (Interior diesel cleaning)

"Results perfect...diesels look almost like new" (Exterior diesel cleaning)

"Have never seen the equal of this material for removing oil and grease" (Interior diesel cleaning)

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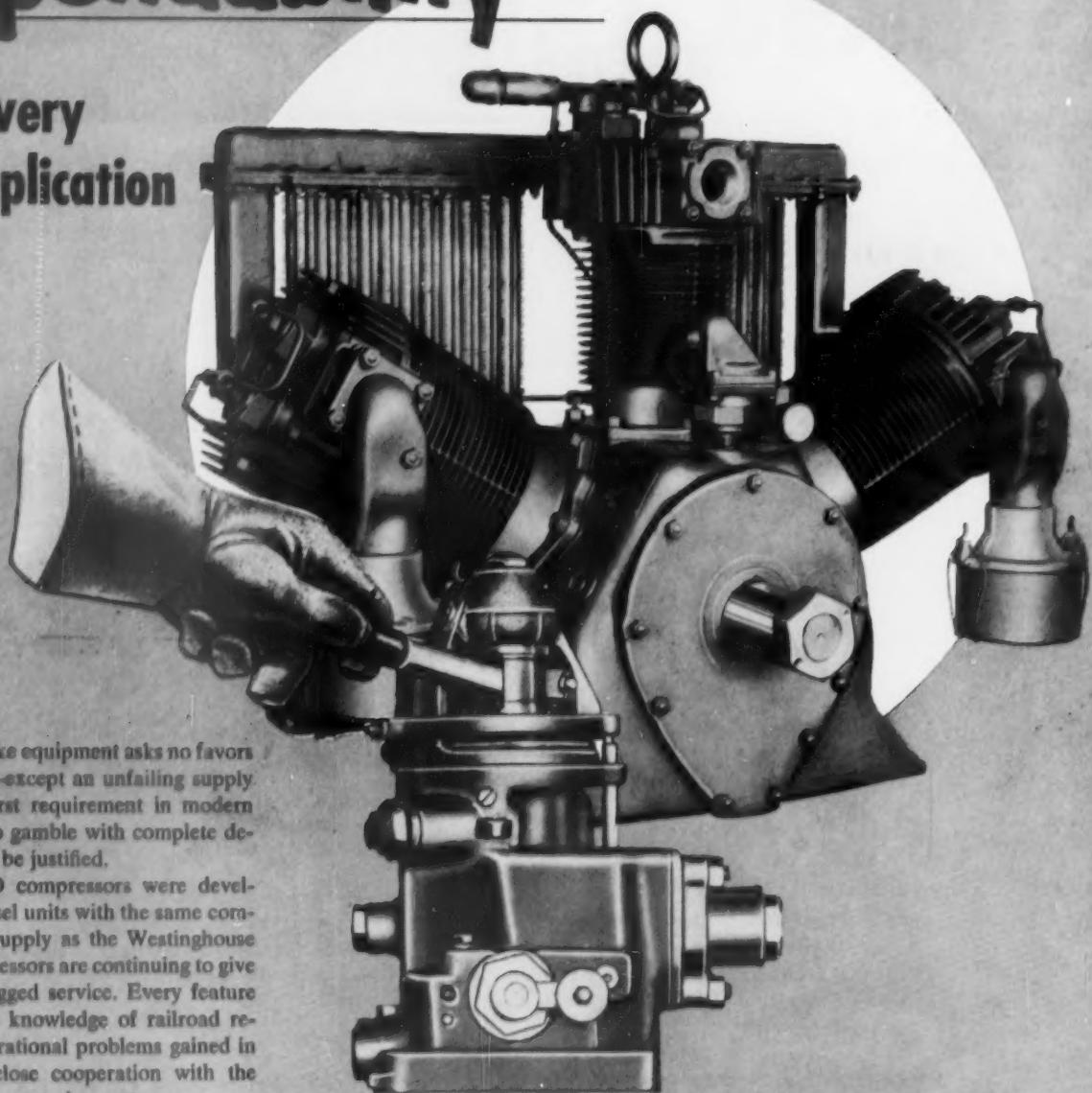
RAILWAY DIVISION

WESTINGHOUSE CD COMPRESSORS

put

dependability

behind every
brake application



Westinghouse Brake equipment asks no favors on any assignment—except an unfailing supply of air. That's the first requirement in modern train control, and no gamble with complete dependability can ever be justified.

Westinghouse CD compressors were developed to provide Diesel units with the same completely reliable air supply as the Westinghouse Steam Driven compressors are continuing to give through years of rugged service. Every feature reflects the intimate knowledge of railroad requirements and operational problems gained in over 80 years of close cooperation with the nation's leading transportation system . . .

1. Radiator-type intercooler between high pressure and low pressure cylinders reduces temperature of discharge air and increases efficiency.
2. Full-pressure type lubrication system maintains even, constant flow of filtered oil to connecting rod crankshaft bearings and wrist-pin bearings.
3. Throw-off of oil from connecting rod bearings lubricates cylinder wall and also main crankshaft ball bearings.

Westinghouse Air Brake
COMPANY

AIR BRAKE DIVISION  WILMERDING, PA.

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RAILWAY LOCOMOTIVES
AND CARS

Founded in 1832 as the American Rail-Road Journal

JULY, 1955

VOLUME 129, NO. 7

Editorials

The Wrong Direction — Service or Scrap ... Nothing Else to Sell

Motive Power and Cars

An Atomic Gas-Turbine Locomotive

37

If the military will build the first one, it will provide itself with a valuable asset and will make an important step toward its wider application.

SP Has Converted Six Cars to Dome-Lounge Type

41

Car length increased to 85 ft., steel frames strengthened, special rig used to assemble dome roof structure.

Diesel Wheels Machined Automatically

45

One new automatic machine not only does twice as much work as three older machines, but finishes wheel hubs to 0.001-in. accuracy.

Engine Bearings of Aluminum

47

Solid aluminum bearings unique as only mono-metal bearings which can operate under heavy or high-duty requirements.

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48

Coordinated mechanical meetings, allied exhibits and machine tool show to offer mechanical men rare opportunity in Chicago.

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50

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51

Southern has reduced maintenance of propane engine-driven generators and air conditioning compressors to the least common denominator.

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Catenary System for Platform Lighting

55

Great Northern's lighting system provides efficient illumination with minimum of supporting poles.

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One success story after another



*passed by last night
on the*



**GREAT AMERICAN RAILWAY
System**

In Montreal and Mexico City, in Tacoma and Tampa you could have seen PS-1 Box Cars on the move last night.

They are the result of research and design which anticipates the wide range of conditions on the Great American Railway System*. And, because they are built to "take it" anywhere, on this system of 402,603 miles of track, they can be counted on to perform at the lowest cost per ton mile, per year of service.

Pullman-Standard sales and service engineers know that the 58,000 PS-1 Box Cars, owned by 60 railroads, are establishing outstandingly successful service records. These engineers, traveling over 100,000

miles north, south, east and west every year, study cars of all makes. They search for the origin of parts failures, then follow-up to find out whether the cures are effective. They know the cause and effect of the toughest operating conditions everywhere.

The findings have influenced the construction of the PS-2 Covered Hopper Car and the PS-3 Hopper Car as well as the PS-1 Box Car. And their reports have helped many railroad mechanical men compare car construction values. Thus engineering that starts in the field, contributes to the successful operation of the cars that are designed and built to serve best on the Great American Railway System.

*A typical box car moves, in one year, on 39 different roads, including two or more trips on 24 roads. (A.A.R. data)

*Built to serve best on the
GREAT AMERICAN RAILWAY SYSTEM*



PS-1 BOX CAR

PS-3 HOPPER CAR

PS-2 COVERED HOPPER

YOUR NEEDS CREATE THE PULLMAN "STANDARD"

PULLMAN-STANDARD

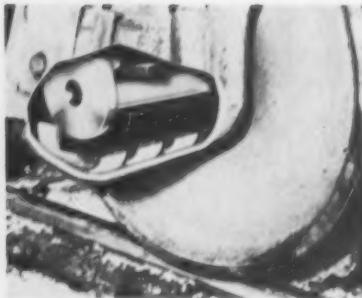
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SUBSIDIARY OF PULLMAN INCORPORATED

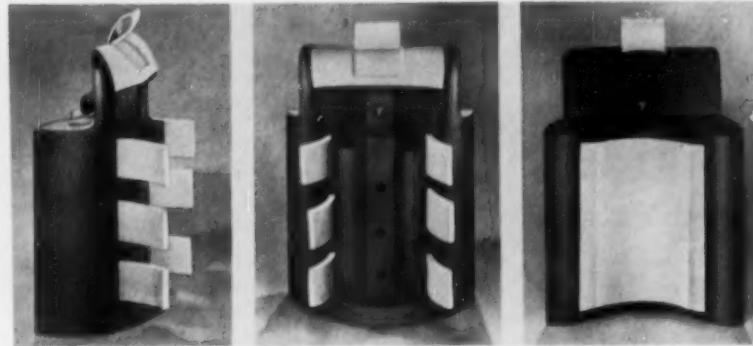
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BIRMINGHAM, PITTSBURGH, NEW YORK, SAN FRANCISCO, WASHINGTON

EQUIPMENT...New Ideas—New Uses



Rubber pad holds the felt wick against the journal surface. To install the lubricator the box must be jacked and the wedge and brass removed.



Side, bottom and top of the Ever-Pac journal lubricator. Wick ends extend into an oil reservoir formed by the lubricator over the bottom of the box.

Journal Box Lubricator

Ever-Pac, which provides wick-fed felt-pad lubrication for freight car journals, has a body of synthetic-sponge-rubber that forms a sealed oil reservoir in the bottom of the journal box. The rubber pad not only seals the oil supply from dirt, but steadily feeds oil over the journal surface and holds the entire assembly in position even during switching shocks.

The rubber pad of this lubricator is resistant to oil, acids, heat and abrasion. The absorbent felt wick-pad fits over the top surface of the pad and its six wick ends pass through slots in the pad into a

recess on the bottom. This recess holds two pints of oil; an additional two pints are absorbed by the pad and wick during saturation before application. The wick-pad can be replaced.

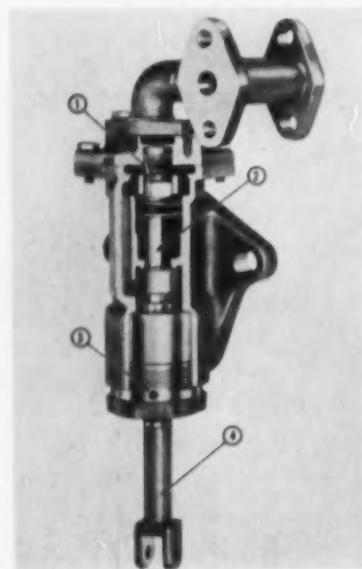
It is necessary to jack the journal box and remove the bearing and wedge to apply the Ever-Pac, but no mechanical changes in the box are required. Because of its compression fit, the lubricator molds itself against the sides and ends of the box interior and can not be dislodged. This is said to prevent loss of oil through the front and rear of the box and to prevent the entry of water and dirt. No seal or special dust-guard is required.

Oil is supplied to the reservoir through an oil filler hole in the front of the lubricator below the journal collar. There is three-way oil delivery to the journal—through the wicks, by pumping through three holes under the felt pad, and by the flexing of the entire pad. The constant, cushioned upward pressure on the surface is claimed to give an even and controlled oil distribution at all temperatures. Every movement of the box or journal supplies additional lubrication. The lubricator now has AAR approval for limited installation on cars in interchange service. *United States Rubber Company, Rockefeller Center, New York 20.*

Brake Cylinder Release Valve

When brakes are bled off for switching on a car equipped with the Caco brake cylinder release valve, the combined auxiliary and emergency reservoir remains charged. This reduces yard time by eliminating the need for bleeding the entire air-brake system to keep the brakes released. When these cars are reassembled into a train, less time is required for charging because little air is needed to bring the reservoirs up to pressure. Designed for application to the AB pipe bracket, this valve is operated by a pull rod like the standard release rod.

To bleed a car it is only necessary to pull the release rod, hold it momentarily, and go on to the next car. Potential brake failures caused by wedging the AB release rod in the open position are eliminated. When the rod is pulled, the Caco brake-cylinder release valve breaks the communication between the combined reservoirs and the brake cylinder through the AB valve. Only cylinder pressure is bled off; combined reservoir pressure is retained.



When a car with the cylinder release valve is back in a train, the restoration of normal brake-pipe pressure resets the release valve at the same time or just after the control valve in the AB valve goes to the release position. Only a short time is then needed to bring the reservoir pressure to a point where the brake is released or ready for a brake test. The Caco brake-cylinder release valve does not affect the operation of the AB valve. The position of the retainer valve, a stopped-up retainer valve, or functioning of the AB valve does not affect the cylinder release valve's operation.

Brake-pipe pressure on top of the floating piston (1) keeps the differential valve assembly (2) located so that there is a normal connection between the brake-cylinder port and the brake cylinder. Reservoirs and cylinder are directly connected and remain this way even when the brake-pipe pressure is released because reservoir pressure is balanced on both sides of the large differential piston and then only acts to hold the small differential piston against its lower seat. When the release rod is pulled (4), it moves the

(Continued on page 10)

**BROWNHOIST Diesel powered
railroad cranes help insure
low cost operation and
improved service on
America's railroads**



In any extensive Dieselization program, cost-minded railroad men include BROWNHOIST Diesel-powered railroad wrecking cranes. Designed especially for railroad service, these powerful, efficient BROWNHOIST units help keep costs down. Their engineering simplifies operation and maintenance, their rugged construction insures long life. Capacities from 80 to 250 tons. Consult a BROWNHOIST representative or write us today for complete information.

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190,000 freight cars have been built

COR-TEN Steel construction

pays for itself many times over

It costs about \$187 more to build a 50-ton A.A.R. hopper car with body sheets of high strength, corrosion-resisting USS COR-TEN Steel of the same thickness as would be used in copper steel.

But this money is well spent—the use of COR-TEN Steel actually pays for itself many times over. First by saving the cost of one heavy repair and second by saving the time out of service such a repair involves.



USS HIGH STRENGTH STEEL

better with USS COR-TEN Steel since 1933

The **FRISCO** turns to USS COR-TEN Steel to minimize freight car repair costs and to assure longer service life

THREE IS SOUND THINKING behind the use of USS Cor-TEN by the St. Louis, San Francisco Railway Co.

The steadily rising cost of freight car repairs has in recent years focused attention on the economic value of construction that, by more effectively resisting damage and deterioration, will help to reduce such expenditures.

As a result, more and more railroads are adopting a *long range* point of view in their car building and rebuilding programs and are today using COR-TEN Steel construction which they know from experience will keep cars longer out of the repair shop.

Take hopper cars for example. During the normal (35 years) life of a car, body sheets of copper steel must be replaced *two or three* times. Under similar conditions and during the same service life, COR-TEN Steel hopper cars will require *only one* replacement of body sheets.

Railroads have estimated that the savings in repair cost thus accomplished are 5 to 6 times the extra first cost of COR-TEN Steel over copper steel. What's more, other substantial savings result from

avoiding the time out of service for the additional shopping required by the copper steel car.

It is with these facts in mind that the Frisco line has in the past five years used USS Cor-TEN Steel construction in 800 new freight cars: in 200 70-ton gondolas built in 1950, and in 300 70-ton drop end gondolas and 300 55-ton hopper cars built in 1953 by Pullman Standard.

These hopper cars have been built with future costs firmly in mind. USS Cor-TEN Steel is used in all sheets that contact the lading. Their dimensions are significant: $\frac{3}{8}$ in. thickness in hopper chutes and longitudinal hoods; $\frac{1}{4}$ in. side sheets; $\frac{5}{16}$ in. in floor and cross ridge sheets.

When you consider that these sheet thicknesses are equal or heavier than AAR standards and remember that USS Cor-TEN Steel has 50% higher yield point than structural carbon steel, has 60% higher endurance limit and 4 to 6 times the resistance to atmospheric corrosion of plain carbon steel or 2 to 3 times that of copper steel, you will agree that longer life than usual and low repair costs can confidently be predicted for this Frisco equipment.



See "THE UNITED STATES STEEL HOUR"—Televised alternate weeks—
Consult your newspaper for time and station.

UNITED STATES STEEL CORPORATION, PITTSBURGH • AMERICAN STEEL & WIRE DIVISION, CLEVELAND
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO • NATIONAL TUBE DIVISION, PITTSBURGH
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. • UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

UNITED STATES STEEL

EQUIPMENT...New Ideas—New Uses

(Continued from page 6)
 differential valve up against the upper seat of the small piston. The valve assembly is then held here by reservoir pressure acting on the bottom of the large differential piston while the brake cylinder and the passages of this valve vent to the atmosphere down past the differential valve guide and through the ports (3). When recharging, the slight excess of brake-pipe pressure over that in the reservoirs necessary to move the AB control valve to

release also moves differential valve to its normal running position where it remains until pull rod is again operated.

All metal parts of the valve except the compression spring are of brass or bronze. Pistons have synthetic rubber seal rings. The valve is lubricated during factory assembly and a wick provides additional lubrication from the floating piston. The valve can be applied to passenger and freight cars. *Crerar, Adams & Co., 1101 West Congress Parkway, Chicago 7.*

C-D-F TAPES of TEFILON*

- Heat Resistant—up to 500° F.
- High Dielectric Strength
- Strong, tough, durable



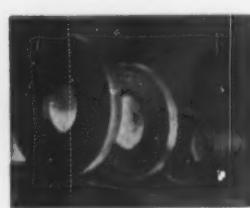
It is no longer necessary to spend time, effort and materials in frequent rewrapping of field coils. Use C-D-F TEFILON tapes for the job—they have unusually long service life. Tapes are easy to apply, easy to handle. Rolls are supplied in a wide range of widths and thicknesses either in 100% TEFILON film or TEFILON glass fabric supported.

TEFLON has high heat resistance—withstanding 260° C. (or 500° F.) without appreciably affecting its physical or electrical properties. It meets Class H AIEE standards for maximum hot spot insulation temperature of 180° C. TEFILON has practically zero water absorption and its electrical properties are little affected after long exposure to high humidity. Its dissipation factor and dielectric constant are extremely low and unchanged over a wide range of frequencies.

TEFLON has a wide range of applications in the railroad industry. For wire and cable coverings where the electrical properties must not suffer impairment even under extreme temperature and humidity conditions, TEFILON is the ideal material. TEFILON may be applied in single or multiple wrapping operations which may include a TEFILON glass fabric cloth supported tape on the outside for resistance to abrasion. TEFILON wrapped cables find extensive use in Diesel locomotive wiring where abrasion of exposed wiring, due to under-car blast, is an important factor.

If you are not now using C-D-F TEFILON tapes and want to know more about TEFILON, the most promising of new plastics, write for Folder T-52 with samples. For technical assistance call your C-D-F sales engineer (offices in principal cities). He's a good man to know.

*du Pont Trade Mark

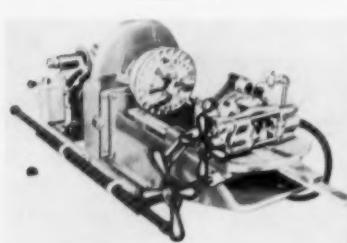


Continental-Diamond Fibre
CONTINENTAL-DIAMOND FIBRE COMPANY
NEWARK 104, DELAWARE

Floor Absorbent

Hi-Dri, a granular mineral compound capable of absorbing large quantities of liquid, is an all-purpose floor absorbent, completely fire-proof, non-abrasive and harmless to the skin. Because of its processing, it does not readily break down or cake under heavy traffic, and does not turn to mud when wet.

While intended primarily to eliminate oil and grease on shop floors, it also absorbs solvents, water, acids, paints, resins and other liquids. Hi-Dri draws liquids completely within itself, leaving no slick on the floor. It is claimed to be effective on all surfaces—wood, concrete, brick, steel and others. On floors, the natural light color of the compound increases visibility. *Waverly Petroleum Products Company, 1724 Chestnut street, Philadelphia 3.*



Threading Machine

An increase in threading speed is claimed for the improved Model-A pipe and bolt threading machine. This unit is designed to be portable. It is equipped with a Power-Grip wrenchless chuck which is claimed to increase the chucking speed and the safety of machine operation. *Beaver Pipe Tools, Inc., Warren, Ohio.*

Diesel Torque-Converter Railway Crane

The 25-ton railway crane powered with a diesel torque-converter unit consists of General Motors Twin 6-71 diesel engines driving through a Twin-Disc torque converter and developing 350 bhp. Either of the engines can be used independently to perform all crane functions, including handling rated loads at reduced speed. Fuel savings are effected through the use of only one engine for light loads.

Each engine has battery charging generators, a starting motor, and a heating unit that can be operated with outside power or from a Kohler light plant on the crane. Each diesel has an auxiliary air compressor with sufficient capacity to supply air for normal operation. A larger compressor coupled to the drive shaft with an air clutch supplies air to permit the crane to operate as a switcher.

The crane, built either as a self-propelling or non-propelling unit, has six-wheel equalized trucks using clasp brakes oper-

ated by both straight and automatic air. One truck is equipped with a hand brake. The self-propelled crane is driven by a combination of spur and bevel gearing. This drive can be disengaged by a pinion shifter from outside the car body when the crane is traveling in a train.

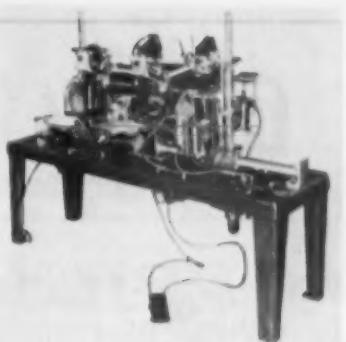
The car body is a welded structural unit. Heavy-duty cast-steel center and end outriggers are provided. An all-steel cab encloses the machinery and the operator's station. Power is transmitted from the torque converter through a chain drive to air-actuated clutches.

In addition to the main and auxiliary hoists a whip hoist drum can be provided. The swing machinery is driven by spur gears from a second clutch shaft. It is operated by an air-actuated friction clutch driving through a combination of worm, spur and bevel gear reductions. In case of an air failure brakes on all the driving shafts set automatically.

The rated lifting capacity of 250 tons is at a radius of 17 ft 6 in. *Bucyrus-Erie Company, South Milwaukee, Wis.*

drying conditions cars have been stenciled two or three hours after painting.

Kem-Kold-Bild is recommended for use over a zinc chromate primer. It has shown no tendency to lift or otherwise adversely affect the primers now in general use. This single-coat car enamel is supplied in standard railroad colors. *Sherwin Williams Company, Transportation Division, Cleveland 1.*



Diesel Fuel Additive

Induco DX200, which is said to clean up carbon sludge faster than Induco Fluid, this manufacturer's original fuel-oil additive, homogenizes and emulsifies the heavy ends, the light ends and the impurities, and suspends them in bubble form. In this state, it is claimed, there is complete burning which results in greater heat output, cleaner engines, increased engine life, and fuel savings. *Industrial Chemical Company, 12134 S. Main street, Los Angeles 61.*

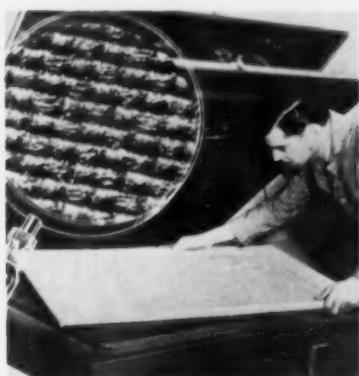
are constructed of boiler plate. All adjustments for operating and setting are made with one wrench in front of the machine and on top of the table. Pin type knuckle holders assure firm clamping action and quick release.

A single foot pedal opens and closes all four slot holders at the same time. A loop is inserted with the spreader in the closed position and is removed while the spreader is closing. The unit has a slot capacity of 0 to $\frac{3}{4}$ in. by 1 $\frac{1}{2}$ in., and a cylinder capacity of 2 in. diameter. Its maximum slot length is 30 in. and minimum is 3 $\frac{3}{4}$ in. The maximum loop length is 48 in., minimum 6 in. It has an angle range from 0 to 140 deg and full angle can be obtained regardless of width of spread. Manufactured by *James Equipment Company, Cincinnati 18* and distributed by *Electrical Service Manufacturing Company, 17th and Cambria streets, Philadelphia 32.*

Coil Former

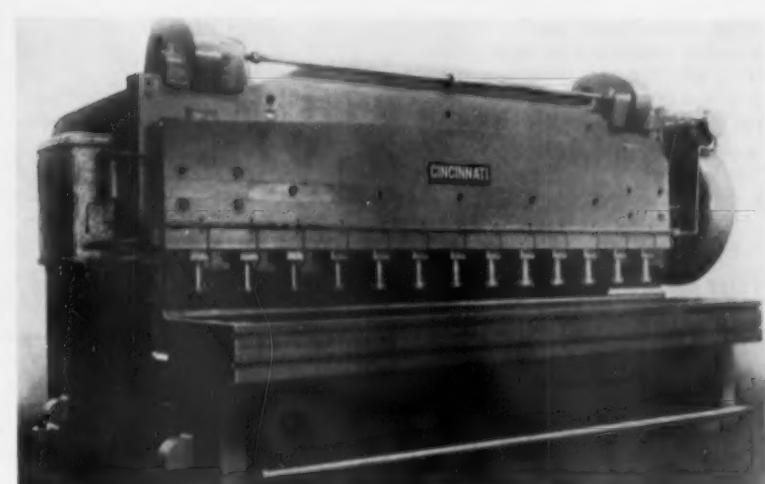
This device can be used to spread heavy coils quickly, accurately and efficiently. Its pneumatic operation takes over practically all the manual labor of coil spreading. Coils are formed with the correct spread and exact pitch and for this reason, they reduce installation time in the stator or armature.

The device is made completely from cold drawn steel, the table legs and top



Applicator Diaphragm

A new rubber diaphragm for heat-vacuum applicators simplifies the application of reflective sheeting to embossed signs. The diaphragm, of rough rubber, allows air trapped by raised letters and borders to escape through evenly spaced, microscopic depressions in the surface of the rubber. This diaphragm replaces the seamless muslin or bleeder strips previously used in the applicators. *Minnesota Mining & Manufacturing Co., 900 Fauquier street, St. Paul 6, Minn.*



Shear

This shear is designed to shear corrugated metals, but will also cut flat plate. Mild-steel sheets 12-ft long can be handled, and there is a slitting adjustment for shearing sheets longer than can be accommodated in one operation. The special table top is recessed to permit proper seating of the corrugated stock, and the

13 hydraulic hold-down plungers are beveled at 45 deg to allow clearance of the corrugations during shearing.

The shear weighs 45 tons, operates at a rate of 20 strokes per minute, and is equipped with a light-beam shearing gauge. The front edge of the table has two T slots. *Cincinnati Shaper Co., Cincinnati 25.*

(New Devices continued on page 82)

Single-Coat Car Enamel

A one-coat freight car enamel, Kem-Kold-Bild, is said to produce two-coat results when applied with conventional cold-spray equipment. This synthetic high-solids enamel gives a 0.00125 to 0.002-in. dry-film in a single coat, and has a gloss finish. No surface sagging has been shown with a coat as heavy as 0.0025 in. Under normal

FACTS ABOUT **Exide**[®]

IRONCLAD[®] CAR LIGHTING AND AIR CONDITIONING BATTERIES

MORE **PASSENGER REVENUE!** ... RESULT OF COOL, COMFORTABLE CARS

WHEN OLD SOL POURS ON THE HEAT, DEPENDABLE EXIDES KEEP PASSENGERS COOL AND HAPPY. DURING EXTREME HEAT AND LONG STATION STOPS, POWERFUL EXIDE-IRONCLADS KEEP EQUIPMENT FUNCTIONING, WITH COMPRESSORS RUNNING STEADILY. IRONCLAD AIR CONDITIONING AND CAR LIGHTING BATTERIES GIVE YOU HIGH UNIFORM VOLTAGE, EXCEPTIONALLY LONG LIFE, AND LOW COSTS. THEY ARE YOUR BEST POWER BUY—**AT ANY PRICE!**

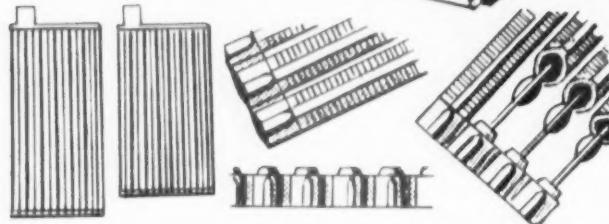


INTRODUCING... THE NEW EH EXIDE-IRONCLAD!

TO SET A NEW STANDARD FOR RAILWAY PERFORMANCE, EXIDE INTRODUCES AN ALL-NEW ENGINEERED AND FIELD-TESTED CAR LIGHTING AND AIR CONDITIONING BATTERY. THE NEW EH—

- DELIVERS 100% CAPACITY INITIALLY!
- ITS UNIFORM QUALITY ASSURES SUSTAINED HIGH CAPACITY DURING LONGER USEFUL LIFE!

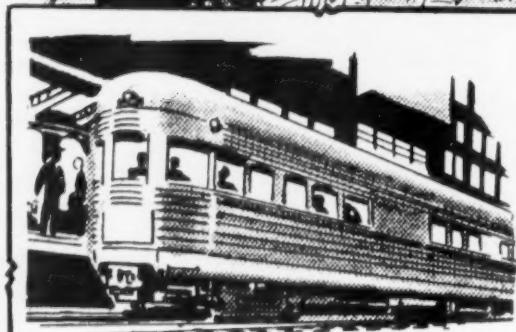
THE NEW EH HAS...



10% LONGER PLATES
IN THE SAME SPACE
YOU GET MORE
POWER FOR A
LONGER TIME!

POLYETHYLENE SLOTTED
TUBES, AND SEALERS
NON-OXIDIZING
PLASTIC GIVES
LONGER LIFE,
PREVENTS SHORTS!

GRIDS WITH SILVIUM
THIS NEW EXIDE
NON-CORROSIVE
ALLOY GIVES HIGH
SUSTAINED POWER
...LONGER LIFE!



BRIGHT STEADY LIGHTS

EXIDE-IRONCLAD BATTERIES KEEP PASSENGER CAR LIGHTS BRIGHT AND STEADY... KEEP CARS COMFORTABLY AIR CONDITIONED. DEPENDABLE EXIDE-IRONCLADS ARE AVAILABLE IN SIZES AND CAPACITIES TO MEET ALL AIR CONDITIONING AND LIGHTING REQUIREMENTS.

WRITE

NOW, CALL YOUR EXIDE SALES OFFICE FOR SPECIFICATIONS OF THE NEW EH. TEST IT YOURSELF. YOU'LL FIND THE NEW EH EXIDE-IRONCLAD IS YOUR BEST POWER BUY—**AT ANY PRICE!**

Exide INDUSTRIAL DIVISION, The Electric Storage Battery Company, Philadelphia 2, Pa.

Install without tools...

Remove without tools...



Certified by A A R
to latest Spec. M-120-47.

MOTOR WHEEL **"Center Articulated" Lid Design** **Gives A Lifetime Closure**

Motor Wheel Standard and Deep Flange Lids can be removed or installed in a matter of seconds - and without tools. Time tested . . . oil and dust tight . . . full 4-way articulation. The extended housing arm facilitates raising lid, opens a full 120° for easy journal box service.



MOTOR WHEEL CORPORATION
LANSING 3, MICHIGAN

U. S. A.

NATIONAL RAILWAY SALES REPRESENTATIVE

T-Z RAILWAY EQUIPMENT CO., G. S. Turner, President
8 SOUTH MICHIGAN • CHICAGO 3, ILLINOIS

NEWS.

More Time to Consider Loco-Inspection Rules

Interested parties now have until November 1 to submit to the Interstate Commerce Commission their "evidence-in-chief" with respect to the commission's proposal to amend its rules and instructions for inspection and testing of locomotives other than steam.

The proposal is the subject matter of the Ex Parte 174 case, and the previous deadline for the initial filings was June 1. Under the new schedule, notices of objections to receipt of any of the evidence-in-chief will be due December 1, and rebuttal evidence will be due January 3, 1956. Requests for opportunity to cross-examine must be made (with notice to the witness involved) on or before February 18, 1956.



Edward O. Boshell

Supply Companies Organize Railway Progress Institute

Organization of the Railway Progress Institute to bring to the public full understanding of the important advantages of streamlining the nation's transportation policy was announced in Chicago May 19.

Chairman of the organization, which replaces the Railway Business Association and will work in close cooperation with the Federation for Railway Progress, is E. O. Boshell, chairman and president, Westinghouse Air Brake Company. C. L. Heater, vice-president, American Steel Foundries, was elected vice-chairman.

Members of the executive committee, in addition to Messrs. Boshell and Heater, are: Nelson C. Desordor, vice-president, General Motors Corporation; Lester N. Selig, chairman, General American Transportation Corporation; M. N. Trainer, vice-chairman, American Brake Shoe Company; Herkett Watt, vice-president, U.S. Steel Corporation; and R. A. Williams, president, Standard Railway Equipment Manufacturing Company.

Any company, other than a railroad, which favors conditions conducive to profitable operation of railroads under private ownership, and which is actively interested

in and will support a program to improve the financial position of railroads, is eligible to join the institute.

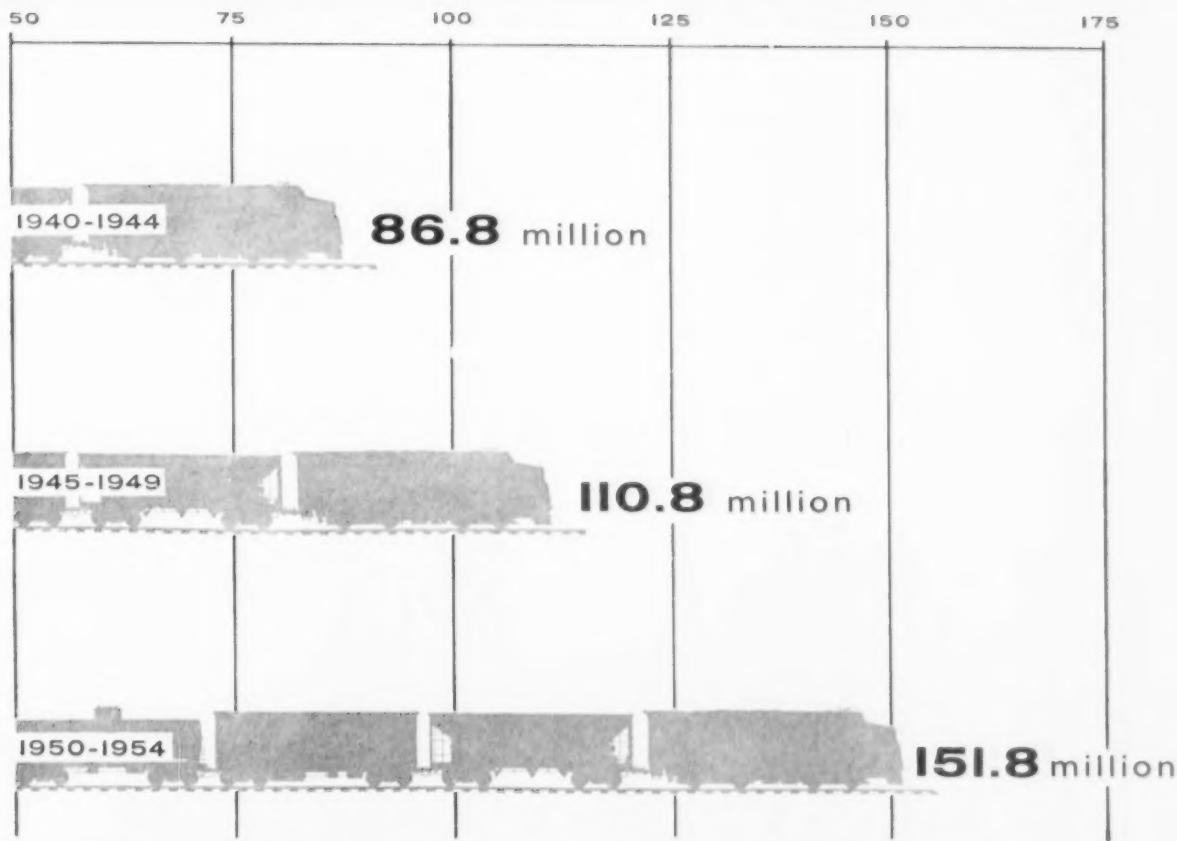
"The new institute," the executive committee said, "will carry on a sustained effort to further the welfare of the railroad industry in the public interest—as well as advancing the legitimate concerns of rail-

way suppliers, whose sales to railways now amount to nearly \$2 billion each year. While the institute is entirely independent of the Association of American Railroads and the railroad companies, it will endeavor to harmonize its objectives with those of the railroads."

(Continued on page 22)

ORDERS AND INQUIRIES FOR NEW EQUIPMENT PLACED SINCE THE CLOSING OF THE JUNE ISSUE

DIESEL ELECTRIC LOCOMOTIVE ORDERS				
Railroad	No. of units	Horse-power	Service	Builder
Chesapeake & Ohio	40 ^a	1,750	Road switching	Electro-Motive
	97 ^b	1,750	Road switching	Electro-Motive
	10 ^c	1,600	Road switching	Fairbanks-Morse
Green Bay & Western	32 ^d	1,000	Switching	Alco Products
	29 ^e	1,600	Road switching	Alco Products
Norfolk & Western	4 ^f	General purpose	Electro-Motive	
	4 ^g	General purpose	Alco Products	
Pennsylvania	50 ^h	1,750	Road switching	Electro-Motive
FREIGHT-CAR ORDERS				
Railroad	No. of Cars	Type of Car	Builder	
Bessemer & Lake Erie	20 ⁱ	70-ton covered hoppers	Pullman-Standard	
	50 ^j	70-ton box	Thrall Car Mfg.	
	1,000 ^k	Box	Company shops	
	500 ^l	Box	Pullman-Standard	
	20 ^m	Covered hopper	General American	
	10 ⁿ	Caboose	International Ry. Car	
	300 ^o	70-ton hopper	Company shops	
	350 ^p	Caboose	International Ry. Car	
	200 ^q	10,000-gal tank	Company shops	
	200 ^r	11,000-gal tank	Company shops	
Wabash	97 ^s	70-ton gondola	Company shops	
FREIGHT-CAR INQUIRIES				
Railroad	No. of Cars	Type of Car	Builder	
Gulf, Mobile & Ohio	200	50-ton box	Pullman-Standard	
	1,500	Triple hopper	Budd	
PASSENGER-CAR ORDERS				
Railroad	No. of Cars	Type of Car	Builder	
Long Island	95 ^t	Coaches	Pullman-Standard	
	6 ^u	Self-propelled	Budd	
For delivery 6 in August, 16 in September, and 18 in October. Total cost, \$7,500,000.				
Scheduled for third quarter of 1955.				
Estimated cost, \$294,000. To have been delivered July 1.				
Locomotive units to cost about \$1,400,000; the box cars, \$3,600,000.				
For delivery in October and November. The new diesels, to cost an estimated \$9,400,000, will be equipped with cab signals and train phone communications equipment. They will replace 66 steam locomotives, and bring the PRR's total diesel fleet to 1,476 locomotives, made up of 2,034 units aggregating 2,811,770 horsepower.				
^a Approximate unit cost, \$7,500.				
^b Approximate cost, \$600,000. Deliveries expected during July and August.				
^c Authorized by U. S. District Court at St. Louis. Estimated total cost, \$7,482,150. The cars will include 250 50-ton 50 ¹ / ₂ ft cars with loading devices and 8 ft doors; 300 50-ton 50 ¹ / ₂ ft cars; 350 50-ton 40 ¹ / ₂ ft cars; and 10 50-ton 50 ¹ / ₂ ft cars with 15 ft doors for special loading purposes. Delivery will begin in September and be completed early in 1956. The court also authorized conversion of 523 open-top hopper cars to covered hoppers at a cost of \$1,673,600.				
^d To cost about \$7,600,000.				
^e Estimated unit cost of these Airstream cars, \$11,790. To be delivered before end of third quarter of this year. The NP's Braemer, Minn., shops have just recently finished converting 50 steel-sheathed box cars to damage-free cars at an estimated cost of \$2,166 per car.				
^f Estimated cost, \$11,500. Delivery expected in September.				
^g Estimated cost, \$2,000,000. Deliveries expected during November and December.				
^h These bay-window cabooses, to cost approximately \$500,000, will have roller bearings and high-speed trucks, cushion draft gears, electric lights, radio communication with locomotives and dispatchers, and modern sanitary facilities. Delivery is expected late this year. The cars are the last to be ordered of 355 units authorized by the directors.				
ⁱ For delivery late this year.				
^j Delivery scheduled for September and October.				
^k This order, plus a 1951 order for 125 cars, on which deliveries have just begun, will give the LI a total of 220 new cars, divided as follows: For non-electrical lines—80 coaches for electrified lines; 22 head end in cars, with motors and controls; 74 "mid train" in cars, with motors but without controls; and 44 motor trailer cars, with neither motors nor controls. In addition, the road has one new Budd RDC in service and another on order. This second installment of new cars will be built at the Worcester, Mass., plant of the Pullman-Standard Car Manufacturing Company. Under the present delivery timetable, the last seven of the 125 first-order cars will be completed by Pullman-Standard the week of November 21 and the first eight of the 95-car order will be delivered the week of December 5. In addition, there will be two self-propelled Budd cars, one of which already is in service between Babylon and Southampton. Equipped with eight-ton electro-mechanical air-conditioners, the new cars now being delivered will seat 120 passengers in specially designed reversible back seats. They will have continuous fluorescent lighting, rubber tile floors, overhead parcel racks, coat hooks at seat locations and grab handles on the aisle side of seats.				
^l Purchase of a third high-speed streamline train has been authorized by the New Haven's board of directors. It will be built by the Budd Company at a cost of \$1,200,000, and is to be ready for delivery in the spring of 1956. The train, which is in addition to those previously ordered from the Pullman-Standard Car Manufacturing Company and ACF Industries (<i>Railways Age</i> , April 4, page 8)—will be six cars long and seat 468 passengers. It is a modification of Budd's rail diesel cars. Each car will be self-propelled by two 300-hp diesel engines, with torque converter drive under each car. An engineer's cab will be at each end of the train, eliminating the need to turn. The problem of third-rail electric power for Grand Central Terminal, New York, will be solved by providing contact shoes on each car which can supply power for special d-c motors on the idler axles of each car. An innovation in the train will be the placing of the cooling housing in the side walls of each car rather than on the roof.				
^m Notes:				
ⁿ Boston & Maine.—The B & M has announced a modernization program which includes rebuilding 500 box cars at its Concord, N. H., shops.				
^o Long Island.—The Long Island has been authorized by its directors to buy 10 diesel locomotive units, which, when received, will end all use of steam power on the railroad.				



Measured in million car-miles per wheel failure, AMCCW chilled car wheels are better all the time!

Improved AMCCW wheel performance since 1940, based on ICC records of car-miles per wheel failure, is shown above in five-year averages.

The continuous progress in safety performance of AMCCW chilled car wheels has been a matter of record for much more than the last five years.

1940-1944	86,800,000 car miles
1945-1949	110,800,000 car miles
1950-1954	151,800,000 car miles

In 1950 when the AMCCW chilled car wheel was re-designed we had laboratory evidence that the re-distribution of weight would be more in line with the stresses developed in today's high speed service.

Now, five years later, performance figures prove in service what the laboratory tests foretold.

When total derailments are considered, including loose wheels and worn flanges, the over-all safety record of AMCCW wheels is consistently better than other types of car wheels in freight car service.

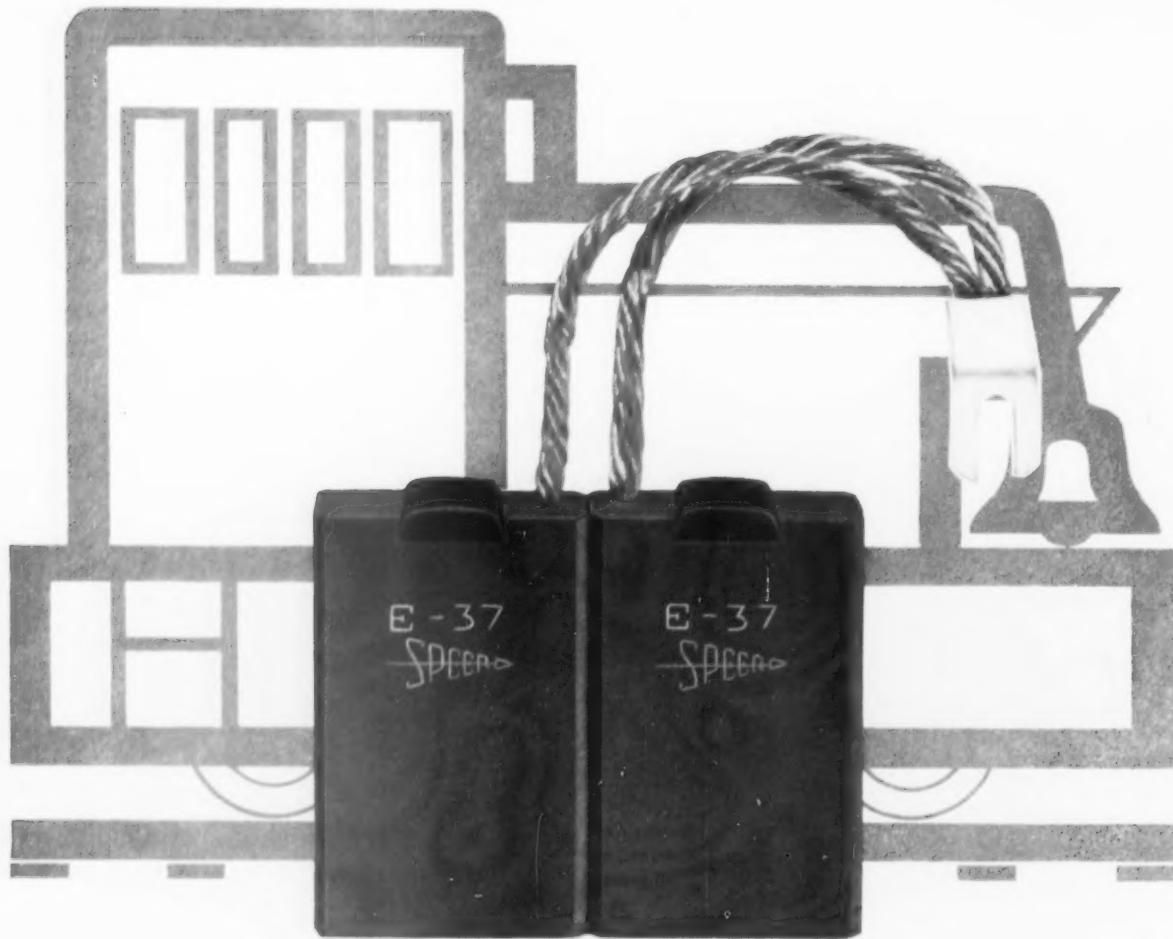


ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS

445 North Sacramento Boulevard, Chicago 12, Illinois

Albany Car Wheel Co. ■ Southern Wheel (American Brake Shoe Co.) ■ Griffin Wheel Co.
ACF Industries ■ Marshall Car Wheel & Foundry Co. ■ Pullman-Standard Car Mfg. Co.

- Low first cost • Low exchange rates
- Reduced inventory • Short haul delivery • Increased ton mileage • High safety standards • Complete AMCCW inspection • Easier shop handling



Here's a brush that's built to take it!

It's the Speer E-37 paired brush, specifically manufactured for use in the traction motors of industrial-type diesel-electric locomotives.

These rugged engines put in a lifetime of grueling service; every day their brushes take a beating from shock and vibration. But the E-37 paired brush assures effective commutation and long, maintenance-free service under stress because its design includes such exclusive features as:

- a neoprene pad inserted in the top of the brush to absorb shock and reduce vibration
- a strong, vibration-proof shunt connection—made solid with Speer's own patented tamping compound

Whether you are maintaining an industrial motive unit or higher horsepower diesel-electric locomotives, there's a Speer brush made specifically for your equipment. And you'll find that Speer brushes consistently have a competitive edge because of their expert design and careful manufacture.

Speer brushes are designed for even wear, reduced vibration. That's why they give you improved commutation, longer service life...than ordinary brushes.



Write now for the new Speer Brush Catalog

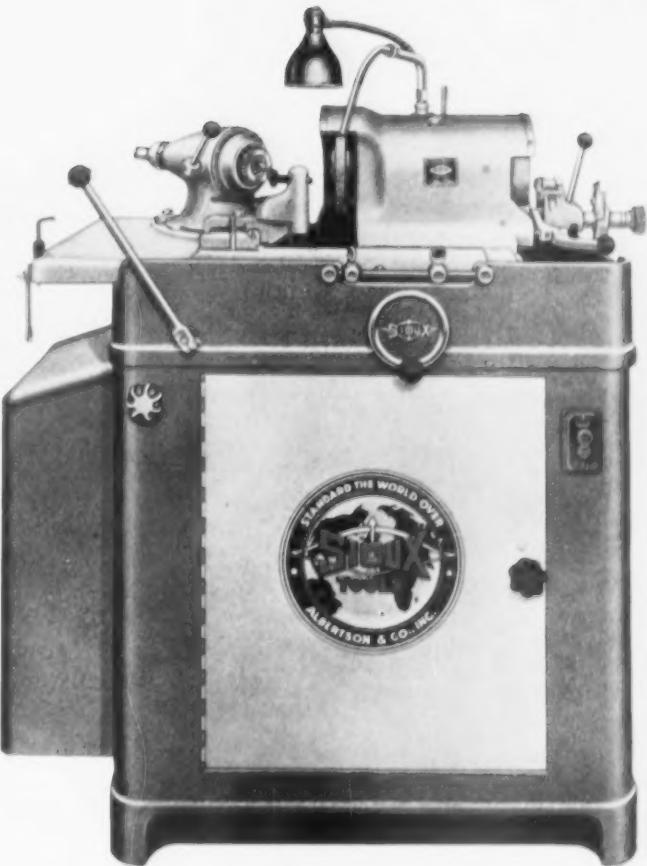
SPEER *Carbon Co.*
St. Marys, Pa.

More SIOUX valve grinding machines are in use than all others combined!

The same basic principles are employed in Sioux machines as in all fine production grinding machines; belts to absorb vibration, easy to clean chucks, accurate to within .001; inverted center floating aligner accurately holds valve in same position that it will operate in engine. The base is cast iron for rigidity and to provide weight for a precision grinder of this type. Way bars are precision made, hardened, and ground to close accurate limits.

Wet grinding reduces wheel dressing, eliminates heat and distortion, produces the finest finish and factory precision. Wet grinding is an integral part of the machine. There is the finest vibration free motor drive.

Convincing testimony to this machine's superior performance may be seen in the fact that today there are more of them in use than all others combined. You can buy your Sioux Valve Face Grinding Machine with confidence. See your Sioux Distributor.



USE SIOUX ALL THE WAY THROUGH

STANDARD THE WORLD OVER . . .

ALBERTSON and CO., INC.
SIOUX CITY, IOWA, U.S.A.

ELECTRIC IMPACT WRENCHES · GRINDERS
FLEXIBLE SHAFTS · POLISHERS · SANDERS
HAND SAWS · DRILLS · ABRASIVE DISKS

2

WAYS TO PUT A CUSHION BETWEEN

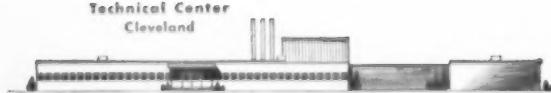
NATIONAL C-1 TRUCKS *for new cars*

You get constant, over-the-years protection for roadbed, rolling stock and lading with National C-1 trucks. That's because C-1 trucks have an efficient constant-friction-control mechanism that cushions lading against vertical and lateral shocks.

And, equally important, C-1 trucks are recognized for their long service life. Hardened spring-steel wear plates, low-stressed wedge springs, and hardened friction wedges are designed and built to last the life of the car. Specify National C-1 trucks for all new cars and get three-way protection—at low maintenance cost.

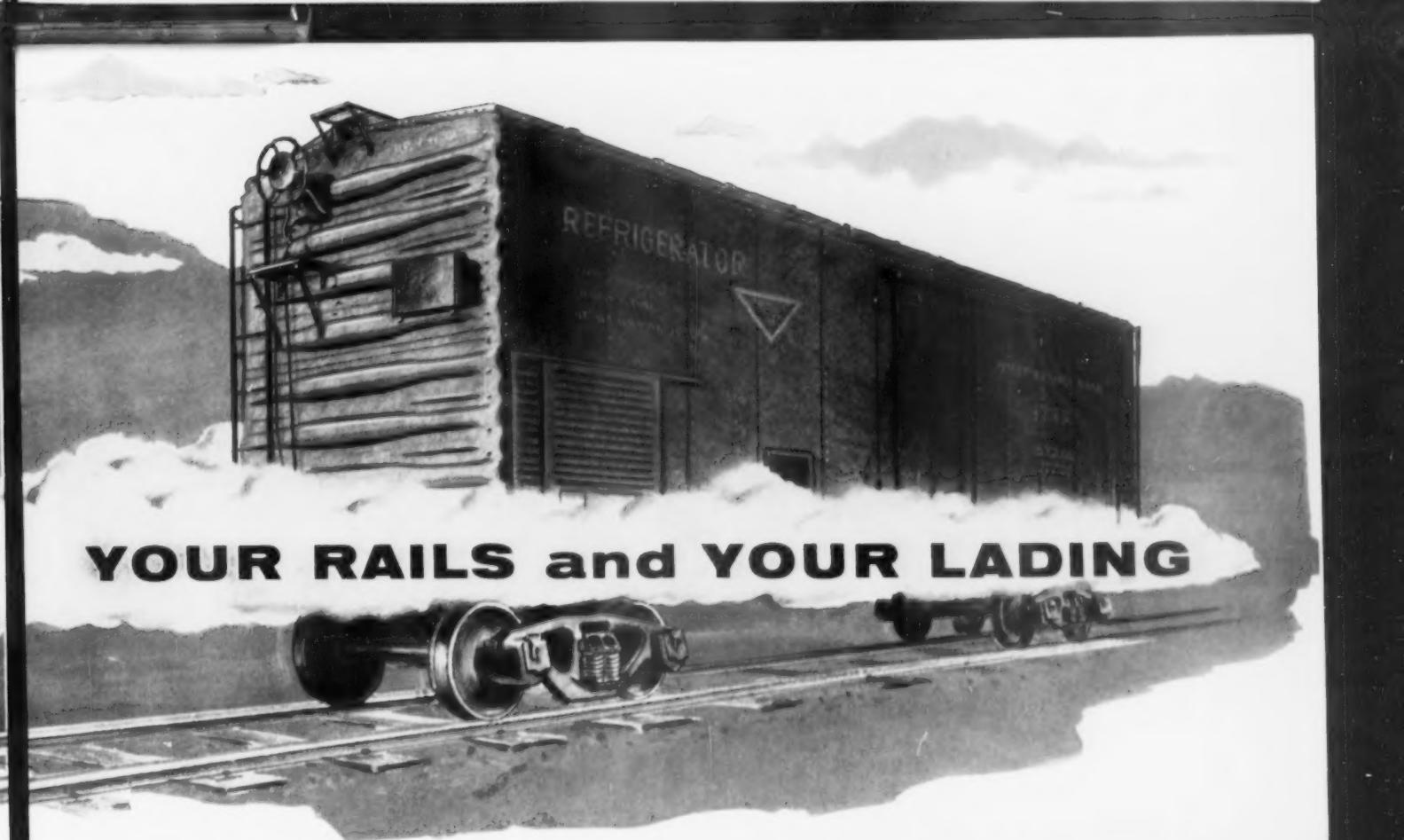
Heart of a smooth-riding car is its friction-control mechanism. Proof of the C-1 truck's long life is evident from a recent inspection of cars after 200,000 miles of service. Full details in Circular 5456 "Facts About the C-1" available on request.

Technical Center
Cleveland



"Progress through Research"

COUPLERS • YOKES • DRAFT GEARS • FREIGHT TRUCKS
SNUBBER PACKAGES • JOURNAL BOXES AND LIDS



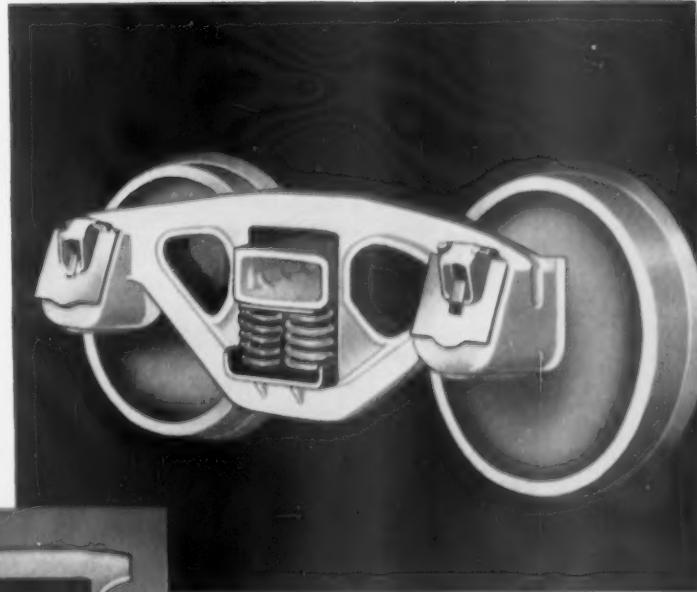
YOUR RAILS and YOUR LADING

NATIONAL
SNUBBER PACKAGES
for upgrading cars

Now even your non-friction-control trucks can have superior riding qualities that mean less wear and tear on track and equipment, more protection for lading. Upgrade your cars with National Snubber Packages. This will provide a softer and smoother ride because they're built on the identical friction-control principle as the National C-I truck.

National Snubber Packages fit most non-friction-control trucks in service today. And they're assembled and installed same as a cluster of load springs. Upgrade with National Snubber Packages and keep damage and maintenance at a new low.

NATIONAL SNUBBER PACKAGES can be supplied either with or without load springs. Since they use AAR Alternate Standard $2\frac{1}{2}$ inch or 1936 AAR Standard 1 $\frac{1}{2}$ inch deflection springs, there are no problems of stocking "special" springs. Circular 5054 "National Snubber Package" available on request.



NATIONAL MALLEABLE
and STEEL **CASTINGS COMPANY**

How the use of NATIONAL Seamless EXTRUDED Stainless Tubing *cuts nut manufacturing costs*



USING NATIONAL Seamless EXTRUDED USS Stainless (type 303) Tubing, the Tri-Clover Division of Ladish Corporation is now turning out hexagonal nuts in less time and at lower cost than they could using solid bar stock. The savings in material cost alone amounts to 11.77 cents per piece.

All machining on the nuts, except threading and O.D. finishing, is done in one operation on a 6-spindle, 3½ inch Conomatic automatic machine. A saving of five seconds in the time cycle was made by using the extruded hexagonal stock versus bar stock. The use of hex tubing has eliminated the cost and upkeep of boring tools and, because tubing is considerably lighter than bar stock, it can be handled faster and with less difficulty.

NATIONAL EXTRUDED Tubing offers you high strength, uniformity, and dependability that only *seamless* tubing can give. For a better precision part, involving fewer operations and fewer machine hours, investigate NATIONAL Seamless EXTRUDED Tubing—made by the world's largest manufacturer of tubular steel products. Feel free to call our engineers if you'd like help in applying NATIONAL Seamless to your product.

* * *

National Tube employs a hot-extrusion process known as "Sejournet" in which white-hot billets of steel are squeezed into tubing of various shapes by a 2,500-ton hydraulic press and ram—a manufacturing method that insures absolute uniformity of wall strength.

NATIONAL TUBE DIVISION
UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.

(Tubing Specialties)

COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO

PACIFIC COAST DISTRIBUTORS

UNITED STATES STEEL EXPORT COMPANY, NEW YORK



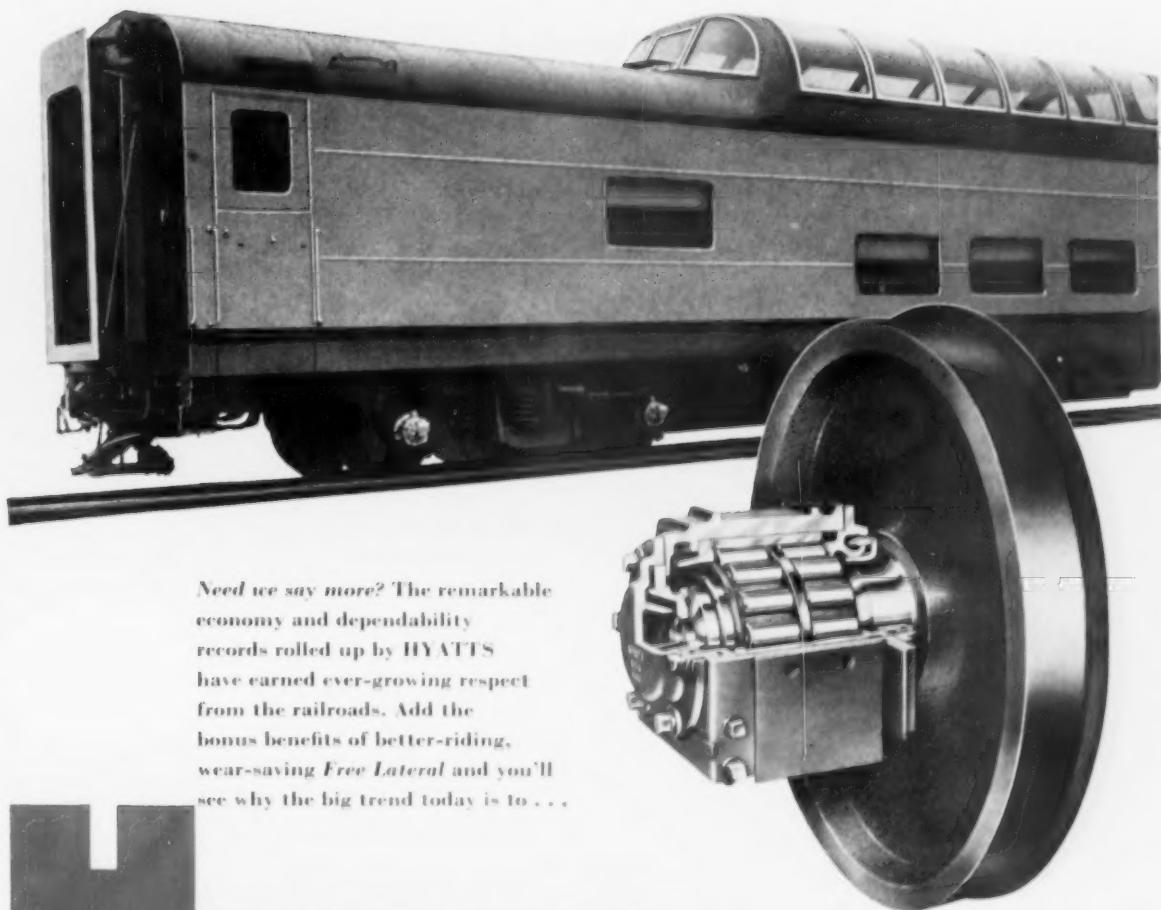
NATIONAL Seamless EXTRUDED TUBING



U N I T E D S T A T E S S T E E L

IN 1954

67% OF THE
ROLLER BEARING JOURNAL BOXES
ORDERED FOR NEW U. S. RAILROAD
PASSENGER CARS WERE **HYATTS**



Need we say more? The remarkable economy and dependability records rolled up by HYATTS have earned ever-growing respect from the railroads. Add the bonus benefits of better-riding, wear-saving *Free Lateral* and you'll see why the big trend today is to . . .

HYATT

RUNNING MATE OF FASTER FREIGHT

HYATT BEARINGS DIVISION • GENERAL MOTORS CORPORATION • HARRISON, NEW JERSEY

**ROLLER BEARING
JOURNAL BOXES**

JULY, 1955 • RAILWAY LOCOMOTIVES AND CARS

NEWS

(Continued from page 14)

Announcement of the organization of the RPI was greeted with statements of approval, by railroad executives.

RDC's Complete Long High-Speed Test Run

A train of three Budd rail-diesel cars—two of the RDC-1 full-coach type and one combine car of the RDC-2 type—successfully completed a high-speed test trip on the Baltimore & Ohio from Washington to Chicago May 28.

At an average overall speed of 61.4 mph, the special train made the 368-mile run in 12 hr 29 min—three hours faster than the 15½-hr schedule of the "Capitol Limited," the B&O's fastest regular train between the two cities.

The return trip was made May 30; because of a different routing through Pittsburgh and a dinner stop at Cumberland, Md., the elapsed running time was lengthened to 12 hr 40 min.

No special preparation of equipment was made for the run; the cars had been in regular commuting service until the day previous, when they were withdrawn and assigned to the special schedule, which had been tentatively set at 13 hr from Washington to Chicago. They were returned to regular service May 31.

The trip was sponsored by the railroad to provide information on the practicability of using RDC's for fast daylight runs between Washington and Chicago, Philadelphia and Pittsburgh, and possibly other cities served by the B&O—which has under way tentative plans for RDC cars with observation dome and dining facilities for such "middle-distance" services.

The special train carried 214 passengers, most of whom were members of the Washington chapter of the National Railway Historical Society.

Westbound crews were changed at Cumberland, Pittsburgh and Willard, Ohio, while the cars were fueled and watered at the same short stops. Supervisory engineers ran the train most of the way.

N. Y. RR Club Announces Seventh Essay Contest

The New York Railroad Club has announced its seventh consecutive yearly essay contest. First prize will be \$750; second prize, \$500; and third prize, \$250. All essays should be in the hands of John Burry, executive secretary of the club, 30 Church Street, New York 7, N.Y., on or before next October 1.

Suggested subjects are: Argue for or against any or all recommendations made by President Eisenhower's Advisory Committee on Transport Policy and Organization; changes in rates and service to improve railroad traffic volume and net earnings, including essayist's views on improving the competitive position of railroads; what railroads can do to improve their system of recruiting, selecting and training personnel, including management per-

(Continued on page 26)

SUMMARY OF MONTHLY HOT BOX REPORTS

	Foreign and system freight car mileage (thousands)	No. of cars set off between division terminals because of hot boxes			Miles car set off
		System	Foreign	Total	
March, 1951	3,063,173	3,667	10,078	13,745	222,852
March, 1952	2,943,812	2,594	5,877	8,471	347,517
1953					
March	2,904,227	2,696	6,077	8,769	331,192
April	2,850,752	3,383	6,435	9,818	290,359
May	3,013,610	5,892	11,433	17,325	173,945
June	2,926,061	8,537	15,296	23,833	122,771
July	2,925,317	9,342	15,775	25,117	116,467
August	2,971,020	8,638	14,160	22,798	130,319
September	2,822,222	6,083	10,195	16,278	173,376
October	3,042,558	3,863	6,493	10,356	293,796
November	2,788,773	1,987	3,464	5,391	517,301
December	2,656,063	1,581	2,550	4,131	642,958
1954					
January	2,583,485	3,082	3,797	6,879	375,561
February	2,445,214	2,953	4,066	7,019	348,370
March	2,658,757	2,196	3,637	5,833	455,813
April	2,570,518	3,079	5,149	8,228	312,411
May	2,713,511	4,416	6,510	10,926	248,353
June	2,662,375	6,597	9,617	16,214	164,202
July	2,678,234	7,956	10,912	18,868	141,946
August	2,696,135	7,568	9,742	17,310	155,756
September	2,614,432	6,740	8,882	15,622	167,355
October	2,852,825	5,182	6,985	12,167	234,472
November	2,717,219	2,515	3,467	5,982	454,232
December	2,751,644	1,501	2,294	3,795	725,070
1955					
January	2,714,070	1,813	2,701	4,514	601,256
February	2,517,483	2,266	3,970	6,236	403,701
March	2,830,398	2,717	5,076	7,793	63,197

SELECTED MOTIVE POWER AND CAR PERFORMANCE STATISTICS

FREIGHT SERVICE (DATA FROM I.C.C. M-211 AND M-240)

Item No.	Month of March	3 months ended with March		
		1955	1954	1955
1 Road locomotive miles (000) (M-211)				
3-05 Total, steam	4,998	6,513	14,427	21,081
3-06 Total, Diesel-electric	35,402	32,458	101,262	92,608
3-07 Total, electric	746	669	2,078	1,906
3-04 Total, locomotive-miles	41,348	39,721	118,373	115,820
4 Car miles (000,000) (M-211)				
4-03 Loaded, total	1,638	1,502	4,631	1,351
4-06 Empty, total	913	882	2,630	2,560
6 Gross ton-miles-cars, contents and cabooses (000,000) (M-211)				
6-01 Total in coal-burning steam locomotive trains	11,321	12,268	32,297	39,776
6-02 Total in oil-burning steam locomotive trains	1,279	1,948	3,694	7,111
6-03 Total in Diesel-electric locomotive trains	99,023	88,561	281,190	252,979
6-04 Total in electric locomotive trains	2,268	2,067	6,272	5,794
6-06 Total in all trains	114,550	105,176	329,462	306,431
10 Averages per train-mile (excluding light trains) (M-211)				
10-01 Locomotive-miles (principal and helper)	1.02	1.02	1.02	1.02
10-02 Loaded freight car miles	42.40	40.40	41.90	40.20
10-03 Empty freight car miles	23.60	23.80	23.80	23.70
10-04 Total freight car-miles (excluding cabooses)	66.00	64.20	65.70	64.00
10-05 Gross ton-miles (excluding locomotive and tender)	2,965	2,832	2,943	2,836
10-06 Net ton-miles	1,320	1,238	1,311	1,247
12 Net ton-miles per loaded car-mile (M-211)	31.10	30.60	31.30	31.00
13 Car-mile ratios (M-211)				
13-03 Per cent loaded of total freight car-miles	63.20	63.00	63.80	63.00
14 Averages per train hour (M-211)				
14-01 Train miles	18.90	18.90	19.00	18.90
14-02 Gross ton-miles (excluding locomotive and tender)	55,391	53,123	55,268	52,988
14-04 Car-miles per freight car day (M-240)				
14-01 Serviceable	15.50	11.40	14.60	11.40
14-02 All	42.70	39.30	41.80	39.40
15 Average net ton-miles per freight car-day (M-240)	853	758	835	767
17 Per cent of home cars of total freight cars on the line (M-240)	49.40	54.90	50.90	51.00

PASSENGER SERVICE (DATA FROM I.C.C. M-213)

Item No.	Month of March	3 months ended with March		
		1955	1954	1955
3 Road motive-power miles (000)				
3-05 Steam	1,451	2,551	4,134	7,888
3-06 Diesel-electric	20,607	21,153	60,889	61,414
3-07 Electric	1,371	1,443	4,059	4,263
3-04 Total	23,430	25,151	69,084	73,596
4 Passenger-train car-miles (000)				
4-08 Total in all locomotive-propelled trains	236,394	239,569	694,359	734,414
4-09 Total in cool-burning steam locomotive trains	8,330	13,162	24,042	30,951
4-10 Total in oil-burning steam locomotive trains	3,537	7,812	9,777	24,095
4-11 Total in Diesel-electric locomotive trains	208,446	212,408	613,602	621,640
12 Total car-miles per train-miles	9.79	9.54	9.68	9.61

YARD SERVICE (DATA FROM I.C.C. M-215)

Item No.	Month of March	3 months ended with March		
		1955	1954	1955
1 Freight yard switching locomotive-hours (000)				
1-01 Steam, coal-burning	261	323	737	1,019
1-02 Steam, oil-burning	43	55	122	161
1-03 Diesel-electric	3,580	3,347	10,234	9,727
1-06 Total	3,892	3,738	11,115	10,940
2 Passenger yard switching hours (000)				
2-01 Steam, coal-burning	10	13	30	41
2-02 Steam, oil-burning	4	3	14	13
2-03 Diesel-electric	249	259	736	764
2-06 Total	291	305	857	901
3 Hours per yard locomotive-day				
3-01 Steam	4.80	4.60	4.70	4.80
3-02 Diesel-electric	15.50	15.20	15.30	15.20
3-05 Serviceable	15.30	14.40	15.10	14.50
3-06 All locomotives (serviceable, unserviceable and stored)	13.20	12.30	13.00	12.40
4 Yard and train-switching locomotive-miles per 100 loaded freight car-miles	1.65	1.73	1.66	1.74
5 Yard and train-switching locomotive-miles per 100 passenger train-car-miles (with locomotives)	76	76	76	76

¹ Excludes B and trailing A units

Go **3** years before repacking journals...with aid of

Proven **PLYPAK**
HOT-BOX PREVENTION



**UNLIMITED
A.A.R. APPROVAL**

The PLYPAK has A.A.R. approval for unlimited application in interchange for those roads desiring its use — protected in interchange. See rule 101.

On cars in normal service, 36 month stenciling saves 50% of waste and repacking labor cost. A.A.R. approval of stenciling on PLYPAK equipped cars obtained on request.

As the result of

3 year service tests with
PLYPAK equipped cars,
three leading railroads have
A.A.R. approval for 36 mo.
stenciling to coincide
with air brake check up.

RAILROAD

FROM REPORTS TO A.A.R.

A "In view of excellent record obtained with more than 3,000 cars equipped with Plypak, we are requesting permission to operate 10,000 cars equipped with Plypak on thirty-six month repack basis."

RAILROAD

B "Upon completion of this 36 months test the Plypaks, bearings, wedges and journals were in excellent condition."

RAILROAD

C "Based on results obtained . . . authority requested to operate 10,000 freight cars equipped with Plypak on 36 month repack basis."

WAUGH EQUIPMENT COMPANY

420 LEXINGTON AVENUE, NEW YORK 17, N. Y.

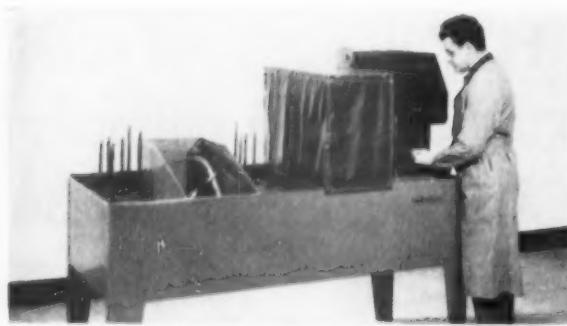
CHICAGO — ST. LOUIS — CANADIAN WAUGH EQUIPMENT COMPANY, MONTREAL



Diesel crankshaft inspection with a Magnaglo RC-1925 unit
at the NEW YORK CENTRAL Diesel Shop in Collinwood, Ohio.

Diesels are Different —

to find cracks in **precision** parts, you need
precision testing equipment **designed for the job**



Zyglo ZA-37 unit in use for rapid and reliable testing of Diesel valves during overhaul — to find any cracks from service.

Magnaglo DRC unit —
maximum sensitivity in
inspection of pistons,
rods, pins, gears, injectors,
etc. Fast, low cost
inspection for shops
where any Diesel work
is done.



MAGNAFLUX CORPORATION
7320 West Lawrence Avenue • Chicago 31, Illinois
New York 36 • Pittsburgh 36 • Cleveland 15
Detroit 11 • Dallas 19 • Los Angeles 58



M A G N A F L U X

RAILWAY LOCOMOTIVES AND CARS • JULY, 1955

With Diesels, you must inspect many more precision parts for cracks than you ever had with steam. For example, cracks are serious in pistons, piston carriers, rocker arms, injectors, connecting rods, crankshafts and others. In any of these parts, cracks may mean road failure, high-cost unscheduled repair, severe damage.

Magnaflux* designs and builds the equipment used by most railroads to find *all* cracks in every working part in a Diesel. Fast, cheap-to-use, and nondestructive, this equipment meets the testing need in each kind of Diesel shop.

THE MAGNAGLO* RC-1925

For major Diesel shops, this unit provides fast low cost inspection of all working parts made of magnetic metal — no matter how big. Crankshafts, axles, and other major parts get quick, positive crack detection that cuts the time and cost of *safe* overhaul. Any small part is easily tested, too.

THE NEW ZYGLO* ZA-37

Makes certain that no cracked exhaust valves, aluminum pistons, or other nonmagnetic parts will get back into service because of "the crack that couldn't be found."

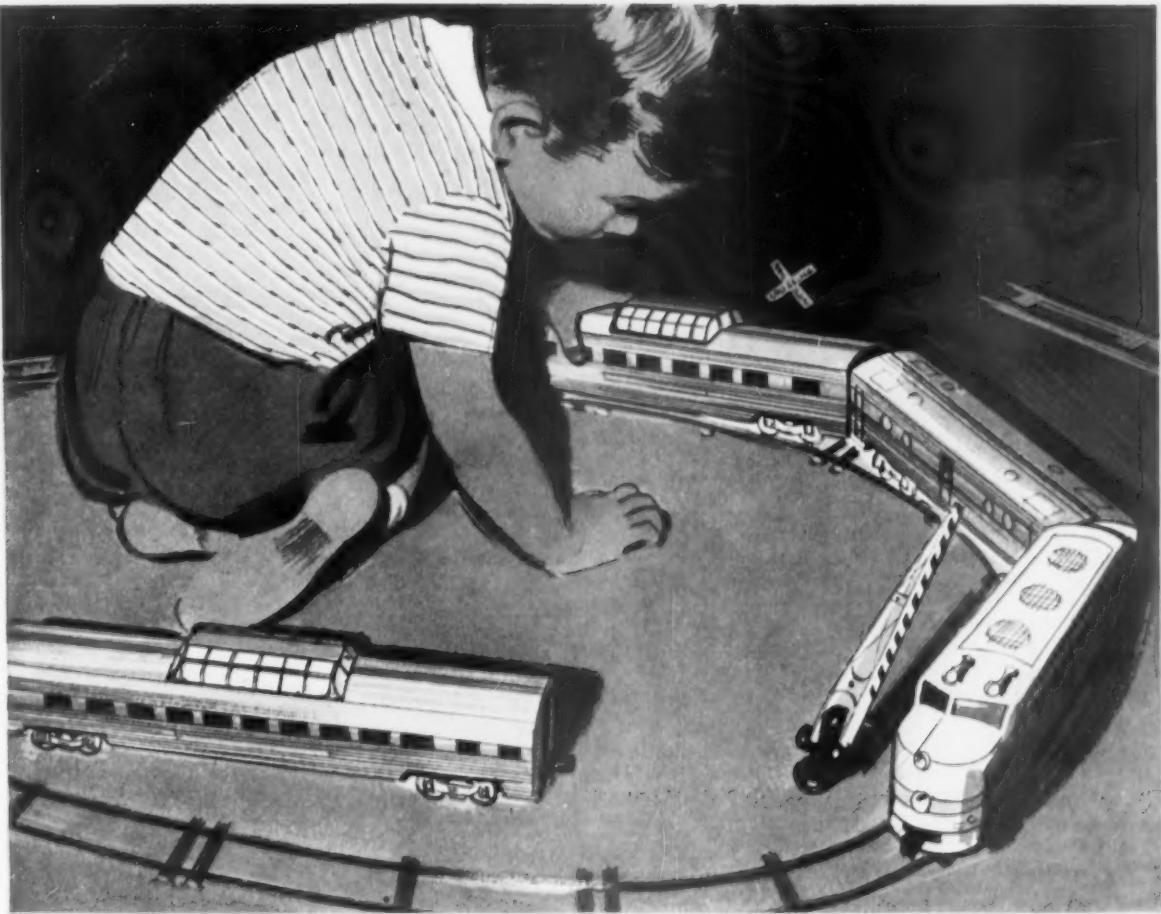
MAGNAGLO* DRC-543

The ideal unit for "topping" inspection in turn-around shops where Diesels must be back on the road in the shortest possible time. Offers maximum sensitivity in fast inspection of pistons, heads, rods, pins, gears, injectors, etc.

Magnaflux and Zyglo units for railroads are built for railroads. Marking every crack with a glowing fluorescent line, they are the only equipment giving positive detection of crack-type defects, with least man hours. They are recommended by railroad authorities as the "standard" accepted test for crack-type defects.

Write today for free interesting bulletins and technical reports telling how railroads are using Magnaflux' testing methods to increase the dependability and availability of their Diesels. No obligation, of course.

*Magnaflux, Magnaglo and Zyglo are registered trademarks
of Magnaflux Corporation.



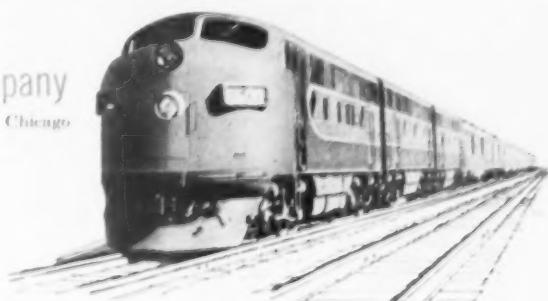
A railroad that doesn't use Adlake equipment? Sure—this one!

But even *this* railroad is influenced by ADLAKE PRODUCTS. That Dome car, for example, is modeled after the revolutionary designs using Adlake Dome Windows that have put a new "see" into sight-seeing.

It's true we don't make equipment for model railroading, but every major American railroad uses the famed Adlake "Breather" windows. And if you take inventory on any railroad, you're sure to find Adlake hardware, luggage racks, curtains, switch locks, signal lamps, lanterns and other specialties for the railroad industry. We're proud of the customer friends we've made in our 98 years of growth with America's railroads!

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Established 1857 • ELKHART, INDIANA • New York • Chicago



Manufacturers of ADLAKE Specialties and Equipment for the Railway Industry

NEWS

(Continued from page 22)

sonnel; what can be done to improve the quality of the railroads' freight-car fleet, including discussion of improved methods of acquisition and financing and the assurance of an adequate supply of high-grade equipment at all times.

Contestants are not limited to suggested topics; but if they wish to submit an essay on another topic, written approval should first be obtained from the club's contest committee.

Miscellaneous Publications

1955 SURVEY OF DIESEL-ELECTRIC MOTIVE POWER IN RAILWAY SERVICE AND NEW 1954 INSTALLATIONS OF DIESEL-ELECTRIC MOTIVE

POWER. Simmons-Boardman Publishing Corporation (publishers of *Railway Locomotives and Cars*), 30 Church street, New York 7. 20-page copyrighted survey, Price, \$5 per copy; quantity rates on larger orders. This survey includes, for the first time, an inventory of each diesel builder's locomotives in service on each of 174 railroads in the United States, Canada and Central America. It shows "(1) how many of any builder's locomotives were installed by a given road during 1954, and (2) how many of X's locomotives were on the property at the end of the year," itemized both by unit and horsepower. The data covers over 26,000 locomotive units with a total horsepower of over 35.6 million.

SPECIFICATIONS FOR CORROSION-RESISTING CHROMIUM AND CHROMIUM-NICKEL STEEL COVERED WELDING ELECTRODES. American

Welding Society, 33 West 39th street, New York 18. 13-page pamphlet. Price, 40 cents. Eight new classes of electrodes—two extra low carbon grades (E308ELC and E316ELC), two columbium grades (E309Cb and E310Cb), two molybdenum grades (E309Mo and E310Mo), and grades E312 and E318—have been added to this revised edition issued jointly by the American Welding Society and the American Society for Testing Materials. These additions cover the recently developed electrodes which have widened the range of stainless steels, clad steels and dissimilar metals that can now be successfully welded. Details are given on test methods, weld metal composition requirements, standard sizes and lengths, packaging and color markings for identification. An appendix aids in selecting the electrode class best suited for a particular application.

PERSONAL MENTION

Baltimore & Ohio

J. A. F. CRAB, appointed master mechanic at Chicago.

G. W. SHORT, master mechanic at Chicago, retired.

Central of Georgia

DAVID H. NOBLE, appointed electrical engineer, Headquarters, Savannah, Ga. Formerly traveling electrical foreman of Atlantic Coast Line.

Chicago, Burlington & Quincy

Aurora, Ill.

N. J. BRICHER, superintendent of shops retired.

C. C. CORNEILS, assistant superintendent of shops, appointed superintendent of shops.

F. W. DUNNING, engineer of tests retired.

R. A. BOERKE has been appointed engineer of tests.

Chicago, Milwaukee, St. Paul & Pacific

E. L. GROTE, master mechanic at Minneapolis, appointed assistant superintendent motive power at Milwaukee.

Chicago, Rock Island & Pacific

ERNEST L. NYLANDER, assistant superintendent, appointed superintendent car department at Chicago.

Missouri-Kansas-Texas

C. H. DICK, general master mechanic at Denison-Ray, Tex., has had jurisdiction extended over Denison Depot car department and all locomotive and car departments south to Waco-Bellmead, Tex., including De Leon sub-division, Stamford sub-division, Northwestern division, and Beaver, Meade & Englewood Railroad.

G. E. STEPHENSON, appointed master mechanic, with jurisdiction over all locomotive and car departments north of Parsons, Kan. Headquarters, Franklin, Mo.

H. C. VINSANT, appointed master mechanic with jurisdiction over Parsons (Kan.) locomotive and shop order shops, Headquarters, Parsons.

F. H. CRANK, appointed master mechanic, with jurisdiction over Parsons (Kan.) car department and all locomotive and car departments south to Denison, Tex. Headquarters, Muskogee, Okla.

J. L. ROUCH, appointed master mechanic at Waco, Tex., with jurisdiction over Warden shop, Bellmead car department, and all locomotive and car departments south to San Antonio, Tex., and Galveston.

R. D. WALTHALL, Jr., appointed assistant master mechanic, Headquarters, Waco, Tex.

R. E. BURRIS, appointed assistant master mechanic, Headquarters, Parsons, Kan.

Norfolk & Western

O. H. JENNINGS, car foreman at Crewe, Va., appointed assistant car foreman at Lamberts Point, Va.

J. L. OAKLEY, gang foreman, freight car shop at Roanoke, Va., appointed car foreman at Crewe, Va.

T. M. NEWMAN, gang foreman, Shaffers Crossing (Va.) car department, transferred to position of gang foreman at Roanoke (Va.) freight car shop.

J. M. CUNNINGHAM, gang foreman, Portsmouth, Ohio, car department, appointed gang foreman, Shaffers Crossing (Va.) car department.

C. M. WILSON, gang foreman at Bluefield, W. Va., appointed gang foreman, Portsmouth, Ohio, car department.

E. A. MANETTA, personnel assistant, appointed assistant superintendent motive power—personnel at Roanoke, Va.

Norfolk Southern



Melvin B. Dowdy

M. B. DOWDY appointed superintendent motive power and equipment, Carolina shops, Norfolk, Va., as announced in the May issue. *Born:* January 6, 1917, at South Norfolk, Va. *Career:* Began as carman apprentice March 17, 1936, later serving successively as air-brake mechanic; chief mechanical inspector; assistant to chief mechanical officer, and assistant chief mechanical officer.

Northern Pacific

St. Paul, Minn.

F. G. MOODY, superintendent of car department, retired.

H. E. BRAKE, assistant superintendent of car department, appointed superintendent of car department.

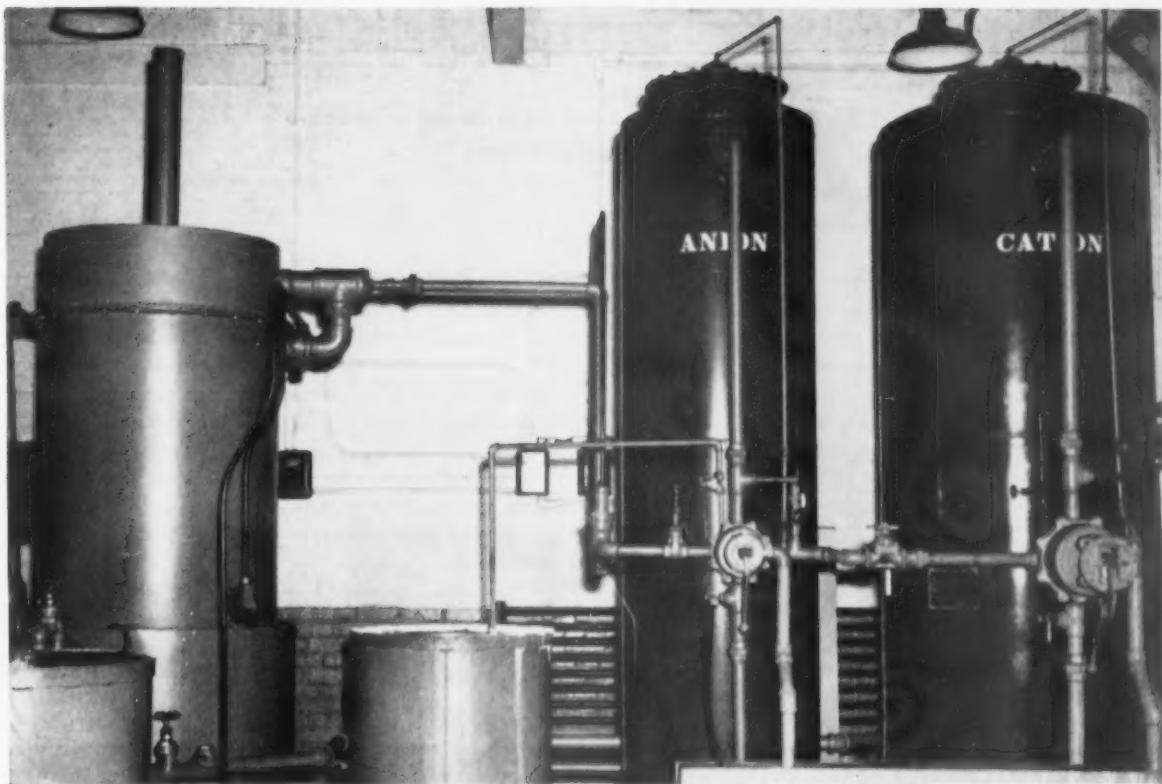
G. A. WEBSTER, general car inspector, appointed assistant superintendent of car department.

D. S. ROY, assistant general air brake inspector, appointed general car inspector.

E. R. MANOR, assistant general mechanical superintendent, retired.

W. R. SHANNON, assistant to general mechanical superintendent, appointed assistant general mechanical superintendent.

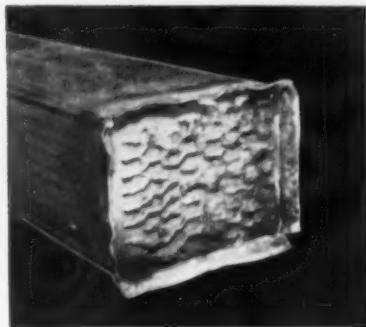
(Continued on page 90)



Dearborn furnishes a complete line of De-Ionizing or Zeolite plants for railroad application.

Dearborn's Water Treatment Systems are Working on the Railroads

As of last December, 163 Dearborn De-Ionizing and Zeolite plants are serving railroads satisfactorily. The demand for these facilities is increasing steadily.



◀ **Water conditioning treatments.**
Specific treatments are required for diesel cooling water, diesel steam generators and package-type boilers. Dearborn has led the field in supplying these treatments for years.

► **Return line corrosion.**
Another modern Dearborn water treatment improvement is FILMEEN® which prevents condensate return line corrosion.

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FILMEEN is the trade-mark of a corrosion-inhibiting compound produced exclusively by Dearborn Chemical Co.

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Please furnish information on:
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Name..... Title.....
Company.....
Address.....
City..... Zone..... State.....

Major Railroad reduces switching time

Six hours siding time per train saved with radio equipped cabooses

THE PROBLEM

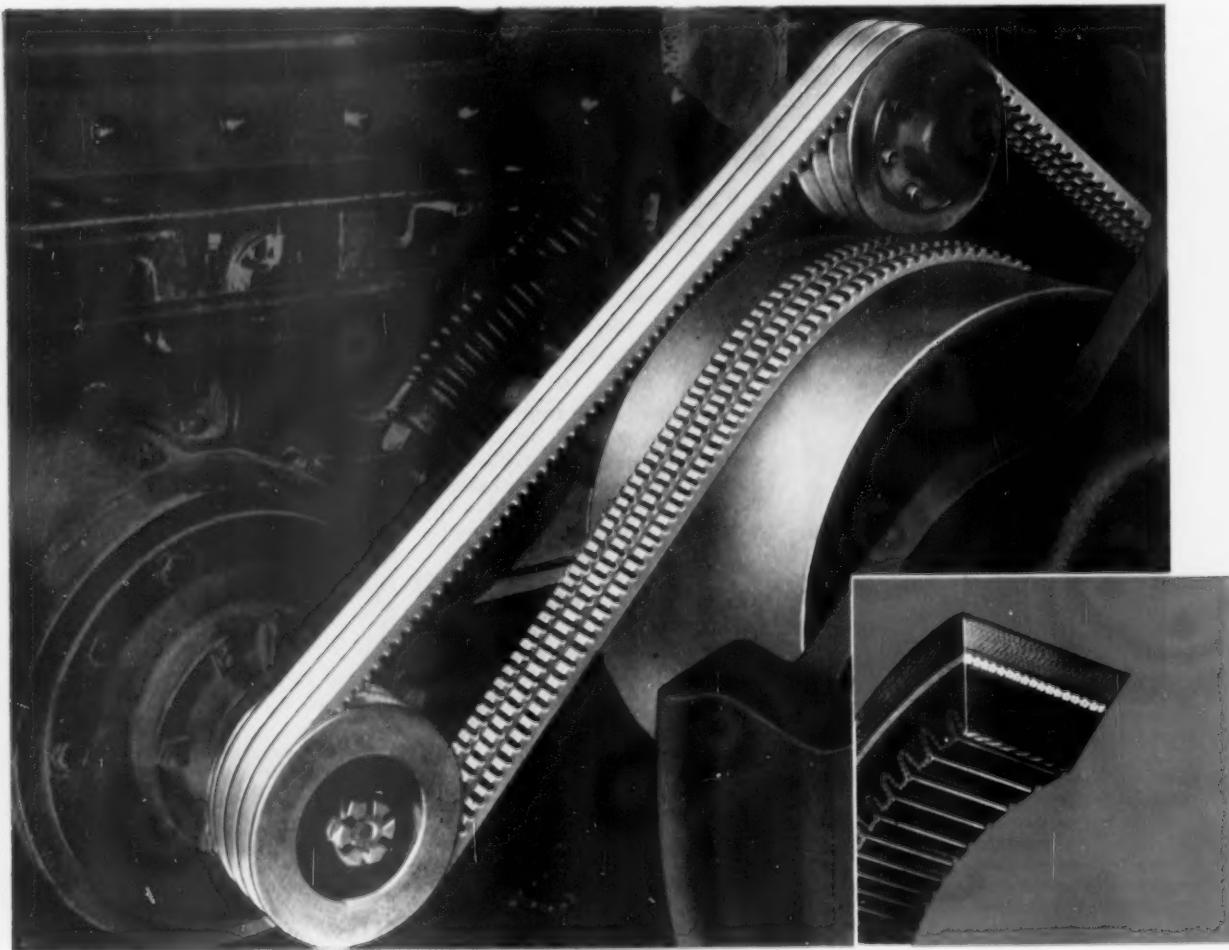
How to speed up movement of freight trains, reduce switching time and lower operational costs with increased safety posed a problem for one of the nation's largest southwestern railroads. Improved communications between caboose and locomotive, between train and dispatcher as well as from train to train was the obvious solution to the problem. This was solved by equipping 250 freight trains with 2-way generator powered voice radios.

How to maintain constant, *unfailing* communications was solved in part by employing Safety Car Heating & Lighting Co. direct drives and Leece-Neville step-up type installations. The final security against power and contact failure depended on the choice of V-Belt drives to develop the power. For the solution to this phase of the problem Dayton Field Engineers were consulted.

THE SOLUTION

Dayton Field Engineers recommended Dayton Endless Cog-Belt axle drives because of their proved ability to deliver extra mileage under all conditions and because of their complete adaptability to both Leece-Neville and Safety Car power plants. On this recommendation the railroad placed 250 Dayton Endless Cog-Belt drives in service and checked them over a two year period. Results have completely justified the recommendation. Time lost in train handling has been reduced 23% . . . actual operating cost lowered 16% . . . 6 hours have been saved *per freight train* in movement through the division.

Even more important, however — as costs went down the SAFETY factor went up with Dayton Endless Cog-Belts, famous for continuous, uninterrupted operation. Constant voice contact between conductor, engineer, and dispatcher



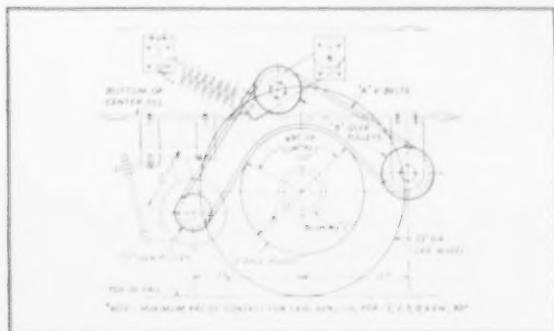
23% with Dayton Cog-Belt® Caboose Drives

personnel was thus assured, switching time minimized. In addition, maximum use of clear track was obtained and added safety guaranteed.

Provides steady electric power for radio communication and caboose lighting

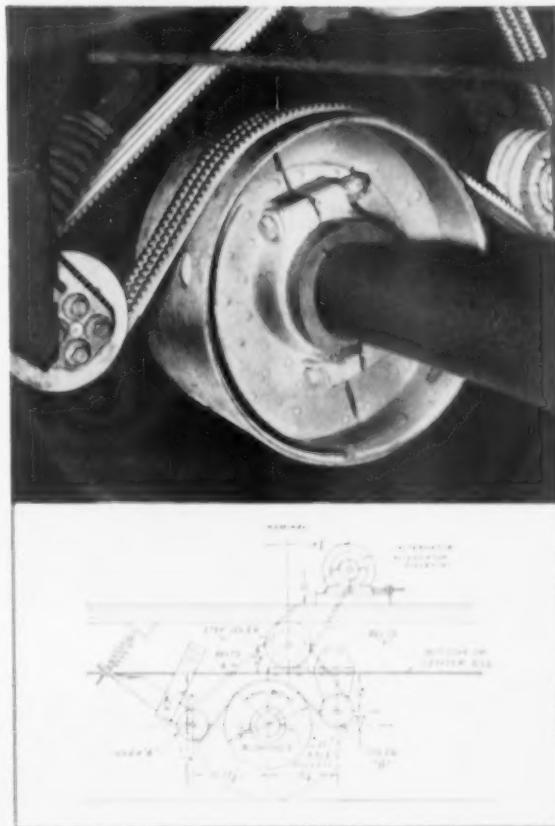
Packing power into generators and safety into railroading, Dayton Cog-Belt Caboose Drives have been in operation since 1942. Now, between 1400 and 1500 Cabooses are equipped with generators for radio communication and lighting or both. Of these, over 90% are equipped with Dayton drives.

If your railroad is not receiving the benefit of extra power at a saving to be found in Dayton V-Belts and Cog-Belts write direct to Dayton Rubber Co., Railway Division, Dept. 204, Dayton 1, Ohio, to learn what Dayton V-Belts and Cog-Belts can do for you.



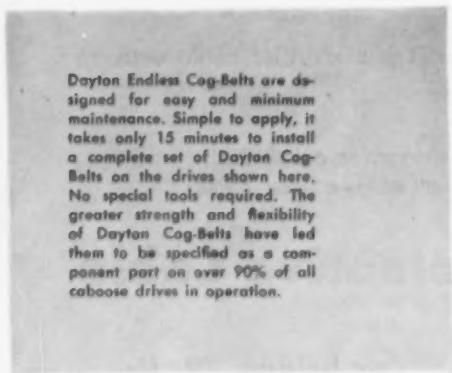
Dayton Endless Cog-Belts on Safety Car Heating & Lighting Co. plant

The generator in this direct-type drive is suspended under the caboose in the customary manner. The drive consists of a single primary or axle segment. Tension for the drive is applied to either the generator or one idler. Dayton Cog-Belts deliver maximum power for the drive because of their established higher load-carrying capacity.



Dayton Endless Cog-Belts on Leece-Neville installation

This is a step-up type of drive, as indicated in the diagram and photo. The power plant has a primary or axle drive and a secondary drive to accommodate high speed alternators and generators which can be placed up inside the caboose. Dayton Endless Cog-Belts are ideally suited to this type of operation.



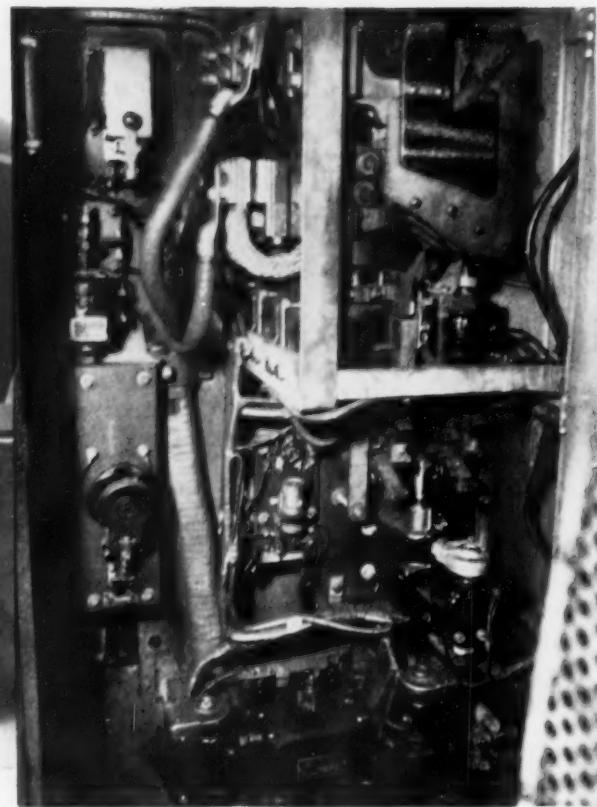
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TM

GOLDEN JUBILEE
Dayton 50 Rubber
YEARS OF PROGRESS

World's Largest Manufacturer of V-Belts

Dayton Rubber Co., Railway Division, Dayton 1, Ohio



Simplex Diesel Locomotive Cable wears an **EXTRA TOUGH JACKET** against Abrasion, Heat, Water, Oil and Acids

- Simplex makes a cable for Diesel locomotives.
- It's insulated with a special rubber compound that heat won't crack or make brittle.
- It has a tough jacket that withstands abrasion, acids, heat, oil and moisture.
- Type A is built for use in conduits, cabinets and terminal boxes.
- Type B is for exposed locations. Type B is a sturdier cable with an extra heavy, reinforced jacket.

For detailed information, ask the Railroad Department at the address below

Simplex Diesel Locomotive Cable

SIMPLEX WIRE & CABLE CO., 79 Sidney Street, Cambridge 39, Mass.



What is back of *wix* ENGINEERED FILTRATION

The research, analysis, testing techniques and engineering that go into a WIX Oil Filter Cartridge do not show in the outward appearance of the product. But they DO show where it counts...*in engine-saving performance.*

WIX engineers fully appreciate the cost factors of repairs, maintenance and down-time with diesel equipment. They maintain a continuing study of fuel and lube oil filtration with the result that many Railroads across America are turning to WIX for qualified assistance with their oil filtration problems.

Whether the service be yard, freight or passenger locomotives or maintenance-of-way equipment...or filtering fuel oil at transfer points and cleaning it for trouble-free injection...WIX Engineered Filtration provides cartridges tailored to fit the need.



The WIX Catalog is a must for you...contains FULL information on the right cartridge for your filters plus a handy cross-reference chart you'll want to have at all times. Write for it!

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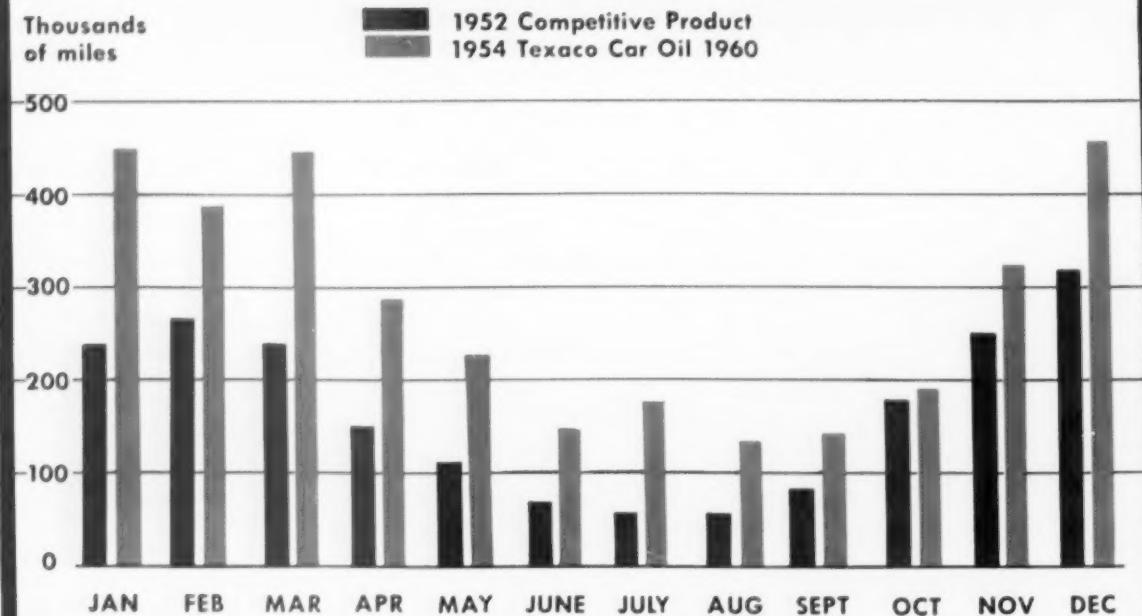
NEW YORK

DES MOINES

SACRAMENTO

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AVERAGE MILES PER HOT BOX SET-OUT



This hot box record speaks volumes for Texaco Car Oil 1960

THE hot box record graphed above was made by a Class I railroad. By changing to *Texaco Car Oil 1960*, hot boxes were reduced from 19,130 in 1952 to 9,517 in 1954. At a minimum estimate by recognized authorities of \$200 per hot box, this resulted in a saving to this road of some \$2 million a year.

If you are interested in savings like this,

let a Texaco Railway Lubrication Engineer give you the full story on this premium-quality car oil and other Texaco Products for railway use.

Just call the nearest Railway Sales Office in New York, Chicago, San Francisco, St. Paul, St. Louis or Atlanta. Or write:

The Texas Company, *Railway Sales Division*, 135 East 42nd St., New York 17, N. Y.



**TEXACO Railroad Lubricants
AND SYSTEMATIC ENGINEERING SERVICE**



TUNE IN... TEXACO STAR THEATER starring DONALD O'CONNOR or JIMMY DURANTE on television... Saturday nights, NBC.

EDITORIALS

The Wrong Direction

Two bills have been introduced in the Senate in the past few months that are of more than ordinary interest to the railroad man and to his future welfare. While neither bill concerns the mechanical department directly they can both readily set a pattern easily adaptable to mechanical operations. The first bill would prescribe minimum standards of training and experience for operating personnel of railroads. The second bill would prescribe minimum standards of safety for track, bridges and related facilities.

Both of these bills will no doubt be advocated as a safety measure by their supporters. Yet the underlying motives of both appear to concern matters other than safety. The first could, of course, be easily written to handicap supervisory personnel in the operation of trains during a strike. The second would prevent curtailing maintenance and large scale layoffs during lean periods.

The first objective will of course be judged good or bad depending on which side of the labor-management fence you are on. The second objective is something no one will quarrel with as greater stabilization of employment is an advantage to all. But is this the way to go about it?

An indirect approach is always inferior to a direct approach. Using safety as a mask to attain another objective is difficult to defend. Another thing hard to defend is using something as rigid as a law to meet a flexible and

changing problem. All too often a law is passed because a temporary condition focuses public interest on some subject. Times and technology change, but the law stays the same. It becomes obsolete. The same interest that caused the law to be passed in the first place does not recur when a mere change is needed. Witness the many regulations under which railroads operate today—regulations that were desirable when passed, but which handicap the industry today.

There is the further problem of adapting one set of rules to all parts of the country unless they are made so general as to be meaningless. A maintenance rule that would be sensible for a heavy duty high speed main line condition in the east would be likely to be rather silly for a light branch line in the west.

Railroads are a frequent target for regulators. Whether the reasons for this are adequate or logical is not important. The fact remains that the industry is vulnerable to regulations which are often harmful to it. It would therefore seem to be to the best interests of all railroad men to learn the nature of any future proposed regulations and to be able to intelligently oppose them. Because, when such rigid regulations become—as they usually do—obsolete with time, they become bad for the railroads, for the public and for all the employees, even those who may have once been temporarily benefited.

Service or Scrap . . . Nothing Else to Sell

"Railroads have only two things for sale—service and scrap." In the efforts necessary to sell today's railroad service, the car department holds a front line position according to Roy E. Baker. The Maine Central's general manager—mechanical outlined the competitive demands on the car department before a recent meeting of the Eastern Car Foreman's Association.

Shippers today are demanding freight cars designed and conditioned for their needs. Subsequent proper loading of these cars is the result of education and inspection. Little things "unself" passengers. Lack of cups and towels in coaches can undo all the results obtained with expensive modern equipment and service. Properly serviced passenger cars and adequate freight cars, safely loaded, must be operated so their performance matches that of competitors. This type of operation is only possible with good car-department maintenance. Moreover, it is only possible when there is cooperation between all departments. Adequate tools and properly trained people are essential.

Mr. Baker outlined the importance of good personnel relations on output. Safety resulting from methods and equipment is vital. Training at all levels is very important. A program should produce men not only better able to

do today's job, but also skilled in probable future positions.

Tomorrow's methods must be considered along with tomorrow's men. More modernization is essential. Facilities and cars must be designed to meet even more extreme demands. Methods and tools should constantly be studied so that work can be speeded.

"It behooves us," Mr. Baker concluded, "to do our very best to further improve and simplify interchange of traffic, study for better and more economical maintenance of equipment in daily operation, and strive for improvements in shop practices for repairing cars."

Mr. Baker's summary avoids the mention of car design. Shippers must have a large part in determining the specifications for future cars. Customers, and not the operating department, will dictate the special features, sizes and type of cars if the railroads are to sell their service. The economy of train load handling means little to a shipper whose only direct contact is with the complex packaging and dunnage that make it possible. Highway competition handles small loads with very little special packing. Complex and specialized car arrangements are necessary to make possible high-speed heavily loaded trains that can handle their loads without damage.



"Specialized" for Diesel-Electric Service

NATIONAL
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BRUSHES

DIESEL-ELECTRIC traction motors, generators and auxiliaries involve a combination of service conditions not duplicated in other types of electrical rotating equipment. That's why National Carbon engineers have consistently worked toward specialization of "National" brushes for diesel locomotives.

First, they set about duplicating road-service conditions in the laboratory. Next, they took the product of this continuing research to the railroads themselves. Cooperating with these railroads and with equipment

manufacturers, National Carbon has developed a complete line of brush grades *specifically* designed for locomotive service.

This specialization program has resulted in much longer brush life, improved commutator condition and lower maintenance costs. This explains why far more "National" brushes are used in diesel-electric locomotive applications than all other brands combined! Find out for yourself the easy way. *Try 'em!*

The term "National", the Three Pyramids Device and the Silver Colored Cable Strand are registered trade marks of Union Carbide and Carbon Corporation.

NATIONAL CARBON COMPANY

A Division of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y.

SALES OFFICES: Atlanta, Chicago, Dallas, Kansas City, Los Angeles, New York, Pittsburgh, San Francisco
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New Books

THE DILWORTH STORY. By Franklin M. Reck. Railroad men who have known and had dealings with Dick Dilworth over the past 20 or 25 years will have many a chuckle over this story. The author has missed no opportunity to portray Dilworth in all the color and saltiness of his personality.

Dilworth, the engineer who guided the development of diesel-electric locomotives for road service into the direction of standardization for assembly-line production, was a self-educated man, with but one-half day of formal education in his whole life. He was by no means devoid of book learning, however. Born in Seattle, Wash., in 1885, the son of a frontier Presbyterian minister, his early education was such as his parents were able to give him at home. Then, after he had run away from home at the age of twelve, he became a foot-loose wanderer. He went to sea; among other jobs he worked as a machinist; for a while he was a telephone lineman. When he was 18 he enlisted in the navy as an electrician and, after some four and a half years, was discharged as a chief electrician.

When he was 24 he was hired by the General Electric Company as a machinist. From that time on he was associated with some phase of the development of automotive type motive power for American railroads.

How a boomer machinist acquired the knowledge required by the chief engineer of the Electro-Motive Division of the General Motors Corporation is illustrated by an incident which occurred on his first job as a machinist. Hired on his own optimistic appraisal of his attainments, he discovered that he would have to know trigonometry to use a machinist's handbook and that he would have to know arithmetic and algebra to understand trigonometry. He never studied anything for which he had no immediate use, but never hesitated to go back and start with the fundamentals on any problem with which he was confronted.

Mr. Reck gives a complete account of Dilworth's accomplishments as an engineer and illustrates his forthright method of dealing with men at all levels with many incidents and anecdotes. But in setting forth Dilworth's accomplishments he has tended toward over inclusiveness. Electro-Motive and Dilworth, then its chief engineer, assumed the responsibility for the design of an articulated rail motor car which was delivered to the Santa Fe early in 1932.

"Up to this time," says the author, "common railroad practice called for attaching the brake cylinder to the bottom of the car. However, on the distillate power car, it was necessary to have the fuel tank attached to the bottom . . .

"So Dilworth conceived the idea that the large brake cylinder should be broken up into small cylinders and 'draped around the truck as close as possible to the brake shoes on the driving wheels.' It seems that Electro-Motive and Mr. Dilworth had some trouble in selling this solution to the customer. The idea, itself, however, had already been developed by the American Steel Foundries and applied to the tender trucks on an order of 4-6-4 type steam locomotives built a year or more earlier and

it was this company's Unit Cylinder clasp-brake design which was applied to the trucks of the Santa Fe rail car.

As a review of a period of tremendous importance in the history of railway motive power the book is not complete. As the story of an unusual personality, whose part in one aspect of motive-power development is known to many men in railway service today, the reader is not likely to be disappointed.

McGraw-Hill Book Company, New York. Price \$3.00.

Letter To the Editor

Should Locomotive Costs Be Measured by the Mile?

To THE EDITOR:

In the May 1955 issue of *Railway Locomotives and Cars*, there is an editorial entitled "Are We Kidding Ourselves," having to do with the cost of maintaining diesel locomotives.

Those who are trying to sell electrification to the railroads have made the same assumptions that your editorial writer did—that there is a constant rise in the unit-mile cost of maintaining diesel locomotives. We have taken exception to that theory, and believe have pretty definite proof that it will not stand careful examination.

In the first place, diesel locomotives have been purchased in large quantities during a period of inflation. It is necessary to reduce costs to a fixed value of money in making comparisons over the life of a diesel. In the second place, an analysis of carefully kept figures on a unit basis for 92 F-T EMD diesel locomotives gives definite indication of a cycle in repair costs per unit-mile, depending to some extent on the severity of the use to which the diesel locomotive is subjected.

We made heavy repairs to these locomotives after about an eight-year life. In the following year the cost of repairs per unit-mile dropped back to about the same level as that attained in their third year of life, which was slightly higher than the repair cost for the locomotives when they were new. Considering the way our fleet was built up over a period of years, we anticipate that the same cycle will apply to each group of locomotives and our repair costs per unit-mile will level off.

There is a third factor that must be considered—is the unit mile the proper measure for considering maintenance on a diesel? Perhaps, a better figure to use would be the number of gallons of fuel consumed which measures not only mileage but also the percentage of the total power being used. This calls for a different approach to maintenance considerations than was used with steam locomotives.

I cannot quarrel with the main theme of the editorial, which is that the railroads should not close their eyes to the economic justification for replacement of locomotives as compared with continual repairing of locomotives.

John M. Budd
President, Great Northern

Here's why you get LOWEST TON-MILE COST with solid-bearing freight cars

Projection of ton-mile costs as related to initial investment shows big economic advantage for solid bearings — even without any allowance for roller bearing maintenance or operating costs.

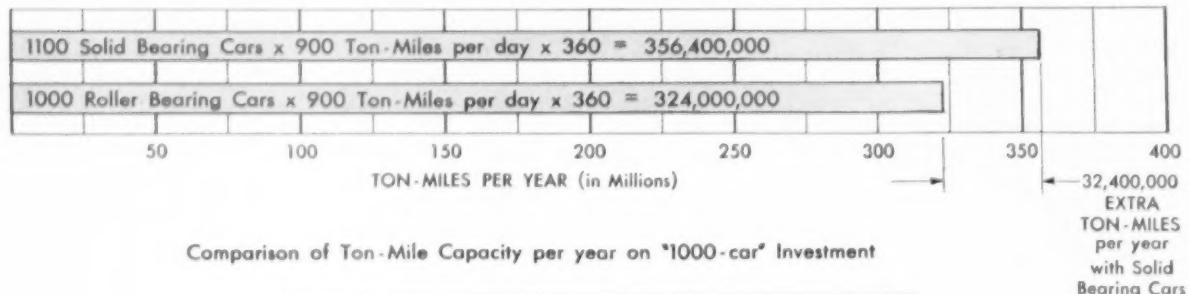
You can buy up to 10% more hauling capacity per dollar when you specify solid bearing cars. That means up to 10% more gross ton-miles of revenue, and the lowest net ton-mile costs for operation!

To illustrate: For the price of 1,000 roller bearing cars you can buy 1100 solid bearing cars. Make due allowance for all solid bearing operating costs on 1100 cars (you don't

even have to consider the roller bearing failure, maintenance and operating costs) and you earn at least \$250,000.00 per year more on your solid bearing car investment.

But suppose you don't need the 100 extra cars? Then you reduce your initial investment by \$600,000.00 and get the same increased return per dollar represented by the \$250,000.00 above — the same overall reduction in costs per ton-mile of operation.

Look at it another way: All your true maintenance costs for solid bearing assemblies will come to less than the interest and depreciation on the cost of rollers. That's positive assurance your overall ton-mile costs are lowest with low-cost solid bearings.*



Still lower costs per ton-mile available

Real savings in ton-mile operating costs can be made with R-S Journal Stops and Satco lining metal. Journal Stops improve bearing lubrication, add to bearing life, and eliminate waste grabs. If all cars in a consist were journal-stop-equipped the train could move to destination without attention to journal boxes. Oiling could be on a periodic basis.

And bearings run cooler with Satco lining. You get lower operating temperatures, higher oil viscosity and a

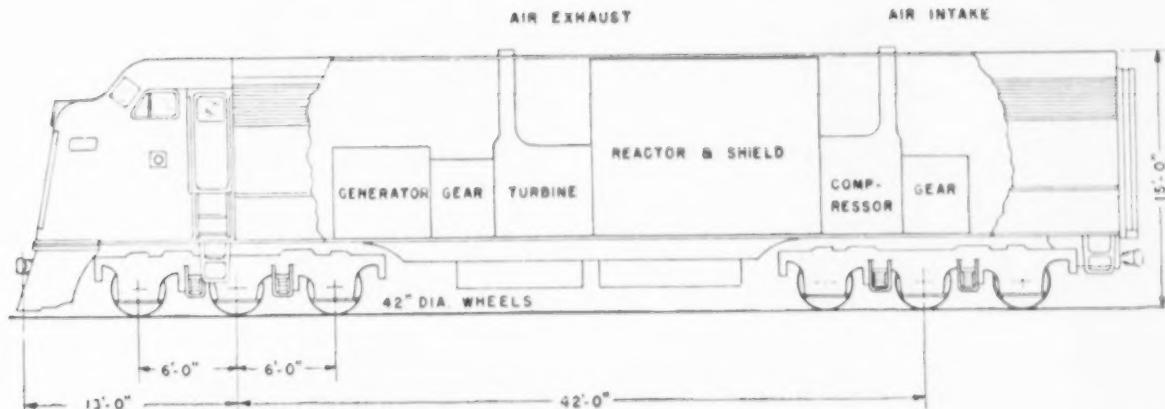
thicker film of oil. Write us for complete information on Journal Stops and Satco. Magnus Metal Corporation, 111 Broadway, New York 6; or 80 East Jackson Blvd., Chicago 4.

MAGNUS
Solid Bearings



* Comparative economic studies available on request.

MAGNUS METAL CORPORATION Subsidiary of **NATIONAL LEAD COMPANY**



Section of an all-purpose atomic locomotive, the shape of which could be modified for yard service. Total length of the locomotive is 68 ft.

An Atomic Gas-Turbine Locomotive

If the military will build the first one, it will provide itself with a valuable asset and will make an important step toward wider application

An atomic-powered, gas-turbine-electric locomotive, built by the military service was proposed by Bruce C. Gunnell, chief mechanical engineer, Southern, at a meeting of the Atomic Industrial Forum, held in New York on May 23-24, 1955.

In outlining the reasons for his proposal, Mr. Gunnell spoke, in part, as follows:

"The American railroads are interested in atomic energy in a general way, because anything that affects industry, also reacts on the transportation business, but our primary interest is in the use of atomic energy to furnish the power to haul our trains, at a lower over-all cost than is being done by our present equipment.

"This may be accomplished by using atomic power in one of two ways, indirect or direct. If the indirect is used, the atomic energy would be converted into electrical power at stationary plants and transmitted through overhead lines to conventional electric locomotives. This is a very feasible way to use atomic energy but at the present time, I do not believe the electric locomotive with all its overhead wires, and other parts of its transmission system, can compete with the diesel locomotive even if the electric power, produced by atomic energy, could greatly reduce our present electric cost.

"This is the picture as I see it today, but if the cost of present day diesel fuel continues to increase so as to become prohibitive for railroad use, it is likewise possible to see a different picture with regard to the electric locomotive.

"I mentioned the use of atomic energy in a direct method on a railroad locomotive. This would mean that the atomic fuel would be carried in the locomotive and converted into power on this unit.

"At this point it would be well to define a locomotive in general terms. A locomotive is an engine which converts fuel or electric power into tractive force at the rails.

"The coal or oil fired reciprocating steam engine has definitely proved itself to be inefficient from a fuel cost, maintenance cost and availability standpoint.

"In my opinion, the steam non-condensing turbine, directly connected, or electric driven locomotive is in the same category as the reciprocating steam locomotive, with an additional disadvantage of being so large that it is only usable in heavy mainline service. If a condensing unit is used, in an effort to save water, the locomotive would be so large that it would be useless on most railroads.

"The internal combustion (diesel) electric locomotive is the most economic and versatile of all modern locomotives. A diesel-electric locomotive can be made up of one to six, 1,500 to 2,400-hp single units, weighing about 250,000 lb each, with all weight on drivers. Such a locomotive can be used in yards or on branch and main lines.

"The other type of locomotive which seems to be showing some promise in recent years, is the gas turbine-electric. This type unit is only in its early stages of development and road tests, and so far it does not com-

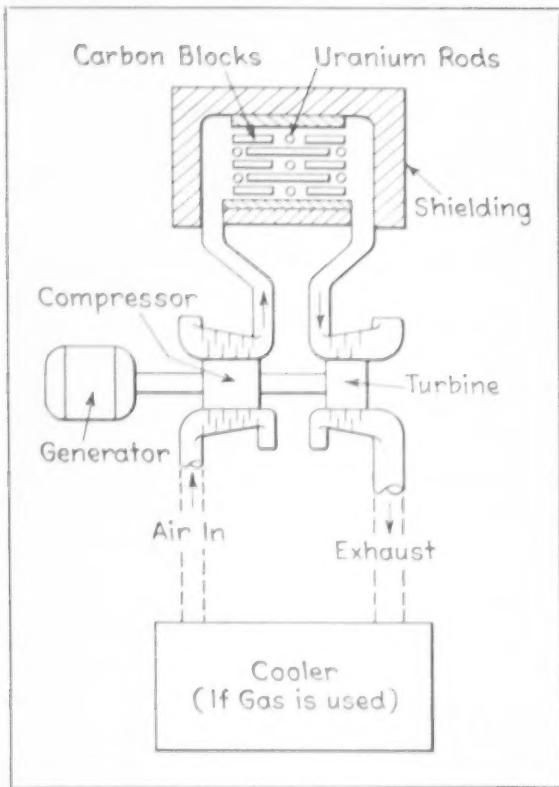


Fig. 1—Air or gas cooled reactor and gas turbine for power generation.

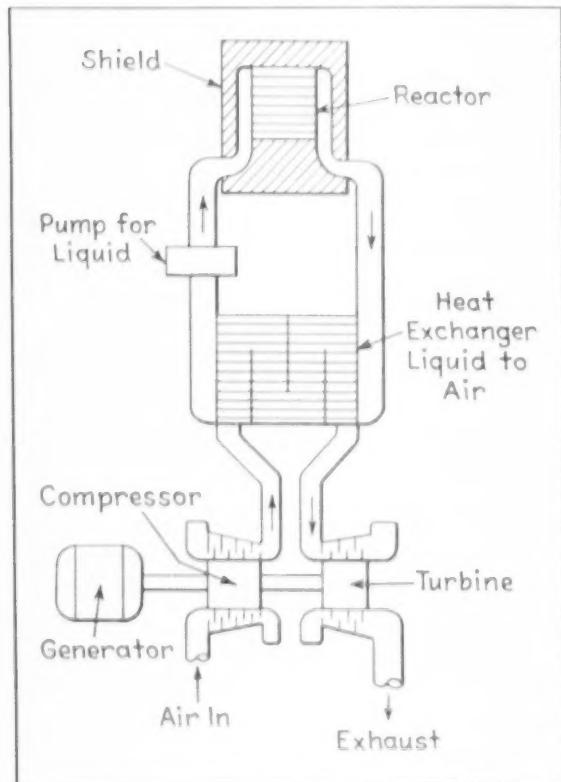


Fig. 2—Liquid cooled reactor and gas turbine for power generation.

pare favorably with the diesel-electric locomotive. It can be made into units of comparable size and weight to the diesel, which is one of its good points. Impurities in the fuel which damage the blades and low efficiency at less than full load output are two of the main disadvantages.

"A few of the important points a locomotive should have are as follows:

1. Economic fuel consumption.
2. Such size and weight that it can be used as a switching unit in yards, or coupled in several multiple units, with single control operation, for use in branch or main line service to pull heavy trains at fast speeds.
3. Require a minimum of maintenance cost, and out-of-service.
4. Simple to operate with a minimum operating crew.
5. Total original cost and operating cost should be kept to a minimum.
6. Last but not least a top priority requirement is that the locomotive be safe under normal and abnormal operating conditions.

"Our interest at this time is the potential use of atomic power by a railroad locomotive. Atomic fuel has a great deal more heat per pound, than do our present types of fuel, as can be seen by the following table:

Fuel	Btu per lb
Wood	8,000
Coal	14,000
Oil	20,000
Uranium 235	40,000,000,000

"From this, it can be seen that atomic energy has quite a potential possibility in the power field, assuming its present cost will be reduced as its use increases.

"As has been shown, an atomic energy source will generate heat. This heat can be used to generate steam or to heat gas (air) for use in an engine or turbine.

"Our next step now is to see in which type of locomotive this heat can best be used.

"The conventional steam-reciprocating locomotive has such low efficiency and availability, I think it should be disregarded. The efficiency of this locomotive is usually seven per cent or less.

"The diesel-electric internal combustion locomotive is the highest in efficiency, about 28 per cent, the highest in availability of all locomotives at present, but an internal combustion engine does not seem to be adapted to the use of atomic energy.

"The steam turbine-electric has not proven itself to be satisfactory for locomotive use, even though much effort has been exerted to develop this type of power. The efficiency does not seem to be much above the steam reciprocating locomotive and among other disadvantages, it requires a large volume of water. The use of a condenser has never proven satisfactory on a locomotive, so I would recommend against considering this type of locomotive for use of atomic power.

"This leaves us the gas-turbine-electric locomotive to consider. The efficiency of this type locomotive is approximately 18 per cent, with a turbine blade temperature of 1,300 deg F, and its availability should be high. The use of atomic energy to heat a gas, say—air, for the turbine seems possible, and I recommend we consider this type locomotive as being the most likely for this use.

"If we take a gas-turbine-electric locomotive adapted to

TABLE I

Data	Diesel	Atomic
1. Locomotive efficiency (per cent)	28	16
2. Fuel per mile (average)	28 lb	300,000 lb
3. Total fuel capacity lb (estimated)	14 gal	
4. Locomotive miles per month (estimated)	14,000 lb	33,000 lb
5. Locomotive miles per year (Item 4 x 12)	12,000	144,000
6. Portion of total Btu's used per fueling, per cent (estimated)	100	20
7. Pounds used per fueling (Item 5 x Item 6)	14,000	6,000
8. Total Btu's per lb of fuel (based on data available)	20,000	40,000,000,000
9. Total Btu per mile used (Item 2 x Item 8)	360,000	982,000
10. Work in Btu per mile (Item 1 x Item 9)	157,000	157,000
11. Total Btu per fueling (Item 7 x Item 8)	28,000,000	264,000,000,000
12. Years between fuel changes (Item 11 ÷ (Item 9 x Item 5))	0.047 (once a day)	1.87
13. Fuel cost new (based on Prof. Lyle Bost's paper at Atomic Industrial Forum Meeting, March 1954)	\$0.042857 lb	\$0.00190 lb
14. Credit for poisoned fuel (estimated 1/3 of cost of new fuel)		\$1,800,000
15. Net cost fuel per lb	\$0.0142857 lb	\$7,200,000
16. Net cost fuel per fueling (Item 5 x Item 15)		\$240,000
17. Net cost fuel per year (Item 16 ÷ Item 12)	\$72,000	\$1,200,000
18. Net cost fuel per mile (Item 17 ÷ Item 5)	\$40	\$600
19. Per cent fuel cost (from Item 18)	100	222
20. Fuel lb per hp per hr (Item 2 x 40 mph ÷ 3,000 hp)	38	700,000 lb
21. Fuel lb per hp per hr atomic plane (Life February 7, 1955) (800 mph x 1 lb) ÷ 114,000 miles x 475,000 hp x .18 per cent efficiency)		700,000 lb

use atomic energy in place of conventional fuel (coal or oil), then the main factor we will have to consider from a general design standpoint is to replace the combustion chamber and fuel storage and handling equipment with an atomic reactor (furnace).

"The reactor may be a solid fuel type or it may be liquid fuel type. It also may use a direct air-cooled cycle or an indirect liquid-cooled cycle. One advantage in the direct air-cooled cycle reactor (Fig. 1), is its simplicity due to the few small number of working parts.

"If a solid type of fuel is used, there need not be any radioactive fluid present to spill or leak out in the case of an accident. Also the reactor with solid fuel is mechanically controlled, while a liquid type fuel reactor eventually may have inherent self-control incorporated in the design. The indirect liquid-cooled cycle type reactor may be used (Fig. 2). In this case, a liquid coolant is passed through the reactor, which absorbs the reaction heat. This hot radioactive liquid is then pumped through a heat exchanger where air, or other gas, will take up this heat and carry it to the power turbine. This essentially eliminates potential danger from the use of air direct from reactor to atmosphere.

"The direct air-cooled cycle reactor would take air from the atmosphere, compress it and pass it through this reactor where it would absorb heat up to about 1,300 deg F, as in the case of the gas turbine locomotives in service on the Union Pacific, and then through the power turbine where this heat would be converted into power, then the air would be discharged into the atmosphere. This exhaust air may be highly contaminated and, if so, would be a potential danger to living bodies which come close to the point of discharge. As the exhaust gases mix with large quantities of outside air, the dilution will assist in reducing such danger.

"A very careful study would be required to go into all the reactor details but from this it can be seen that each

type has about as many advantages or disadvantages as the other.

"Our problem now is to see how such an atomic reactor can be fitted into a locomotive.

"In selecting the size and weight for an atomic locomotive, we should start with one that can be used in freight and passenger road service, and in switching service, on most of our standard American railroads, and also could be used by our military. It should be designed so it can be operated as a single unit or as multiple units from one control cab. The controls should be simple and maintenance cost reduced to a minimum. It should be designed so there is a little potential danger to personnel or property.

"General specifications of such a locomotive could be as follows:

Atomic reactor heat output, hp	15,000
Shielding weight estimate, lb	85,000
Gas turbine, into generator, hp	5,000
D-c electric generator, hp	5,000
5-c traction motors, hp	500
Two three-axle trucks. Wheel diameter, in	42
Total weight of locomotive, lb	84,000
Weight on drivers, lb	34,000
Traction force continuous, lb	96,000
Length of locomotive, ft	68
Height of locomotive, ft	15
Width of locomotive, ft-in	10-6
Train steam-heat exchanger, lb per hr	1,000

"A diesel locomotive uses about 2 gal of fuel per 1,500 hp per mile in road service. The overall efficiency of this diesel will be about 28 per cent, at full throttle, full load, and this efficiency drops only slightly as the throttle and load is reduced.

"A present day oil-fired gas turbine will have about 15-18 per cent overall efficiency at full throttle full load.

Table II

Data	Diesel	Atomic
1. Expected life, years	15	15
2. First cost @ 15-yr life	\$ 20,000	\$ 69,333
3. Maintenance per year (diesel 40¢ per mile)	\$ 57,600	\$ 115,200
4. Cost fuel per year (Item 17, Table I)	\$ 57,600	\$ 128,000
5. Cost fuel storage, handling and liability in addition to diesel (estimated)	—	\$ 20,000
6. Train crews same as diesel	—	—
7. Extra cost supervision and training over diesel (estimated)	—	\$ 10,000
8. Total cost per year per locomotive	\$ 135,200	\$ 140,233
9. Operating cost per mile	\$.94	\$ 1.240
10. Per cent operating cost (per cent)	100	78

Note: Interest on above fixed charges not considered.

This efficiency falls very rapidly as the throttle and load is reduced due to the characteristics of the turbine design, and also due to the large compressed air requirement of the gas fired turbine in order to control the temperature.

"There is no efficiency data available on an atomic energy gas-turbine, so all I can do is use my own judgment in order to arrive at some figure.

The turbine	20 per cent efficiency
The electrical transmission	10 per cent efficiency
Total efficiency	16 per cent

"I feel that all these efficiencies are realistic.

"From these figures, we can list the following data in an effort to compare an atomic powered gas turbine-electric locomotive with a modern diesel electric locomotive. (See Table I.)

"We should now weigh the good and bad points of each of these two types of locomotives, and where possible, relate these comparisons in terms of money—namely, dollars.

"Fuel is our first item to consider. The purchase price of fuel on a large fully diesized railroad operating about 1,000 diesel units of 1,500 hp each will run about 160,000,000 gal at 10¢ per gal, or \$16,000,000 per year.

"It would take 500 atomic units of 3,000 hp each, to "atomize" this railroad.

"The development cost of the first atomic locomotive would probably be at least \$20,000,000. The cost per 3,000-hp unit, after mass production manufacturing is started would probably be about \$1,000,000 each for the first 500 locomotives. If the development cost is absorbed by the first 500 units, then they would cost \$1,040,000 each, as against a two-diesel unit costing about \$300,000. The expected life would be about 15 years for each type. Therefore, an atomic unit would cost \$1,040,000 \div 15, or \$69,333 per year, and two diesel units would cost \$300,000 \div 15, or \$20,000 per year.

"The maintenance cost for a 3,000-hp diesel locomotive is about \$40 per mile, or 144,000 \times \$40 = \$57,600 per year. In light of the fact that many parts of an atomic locomotive will be radioactive (hot), causing it to be unsafe for mechanics to make repairs on the locomotive, the assemblies will have to be removed and set aside to cool off which may take months or years before repairs can be made. In some cases, the parts may have to be "dumped," which would result in a complete loss. A

conservative estimated figure for maintenance cost per mile will be twice that of a diesel, or \$80 per mile, or \$115,200 per year per 3,000-hp unit.

"The fuel estimate is taken from Table I. The storage and handling of used atomic fuel is very difficult and requires specialized equipment and personnel, but the quantity of the fuel and the frequency of refueling will be much less than for diesel fuel. The cost of fuel handling should balance each other. However, I am combining this possible additional cost with that of the liability insurance and other costs.

"The cost of the train crews should be the same for both types of power.

"These are some of the main costs and are enough for our present needs as shown in Table II.

"We now come to the subject to which no one living knows the answer, so I feel that I can speak freely. Safety-liability.

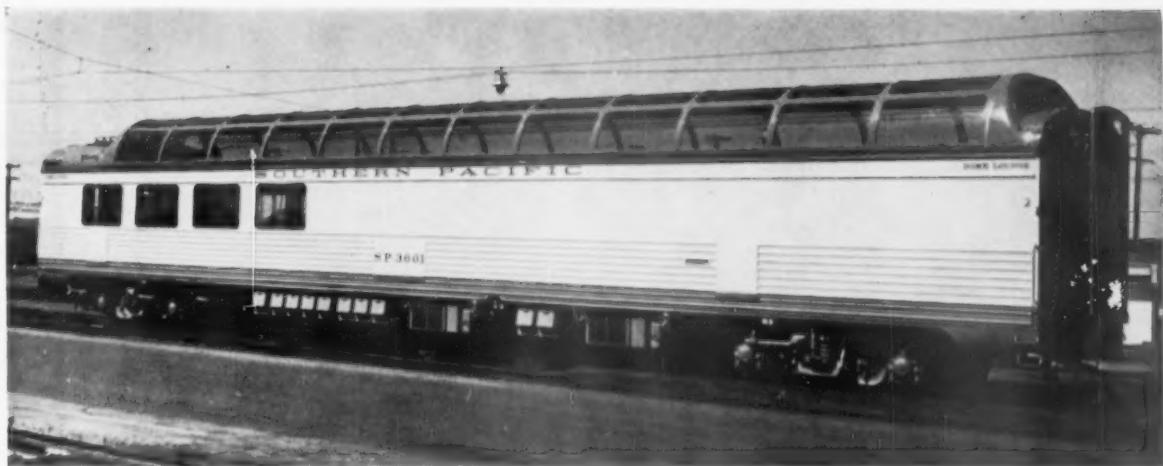
"This can be broken down into two phases. One phase is the normal danger that personnel are subjected to the radio-activity of the atomic fuel. I believe this phase can be handled satisfactorily with the present know-how and the careful training of railroad men. This, of course, will cost a great deal more than it does to train and supervise diesel maintainers, say, \$10,000.00 per year per atomic locomotive.

"The other phase is what will be the consequence when something goes wrong with the equipment as a result of the failure of mechanical parts or personnel failure. I want to make it clear that I do not believe there is much danger from a controlled chain reaction, resulting in an atomic explosion; in fact, I am going to disregard this possibility. What I am talking about is a result of the failure of some safety equipment which would stop the control rods from operating. The reactor in this case could get so hot that it might melt down and run out on the ground. Of course, if this happened, the ground would become so radioactive that personnel could not come near it. The track would have to be abandoned for a long period of time, or the ground dug up and carried away by the use of very special equipment."

Mr Gunnell then proceeded to paint a vivid word picture of a collision between two atomic locomotives on the "Uranium Valley Railroad" caused by a highway truck in a densely populated area during a time when all airplanes were grounded by bad weather. In his story, which he says is pure fiction, but a possibility, the reactors get so hot that they melt and run into the street. The result is that an area of several hundred feet radius has to be closed off to be cleaned up later by means of a very expensive process.

He concludes by saying, "I do not believe that an atomic powered locomotive can be justified for use on our American railroad system for serving the public at the present time, or any time in the next 10 years, but there is one place I feel that an atomic locomotive would prove very valuable at the present time and that is in military service. A 3,000-hp unit may be a little large, but this can probably be reduced without too much difficulty. Think what a wonderful advantage it would be to have a military locomotive operating in some remote field, that only required refueling every six months."

"I recommend the military service as the first and most likely place for such a unit to be used, and it certainly does have great possibilities in this field."



SP Has Converted Six Cars To Dome-Lounge Type

Car length increased to 85 ft; steel frames strengthened. Special jig used to assemble dome roof structure

Six Southern Pacific dome-lounge cars, Nos. 3601 to 3606, inc., have been converted from existing lightweight cars at the company shops, Sacramento, Cal. They are all of the same design except that the elevated section of the first four cars consists of both a lounge and coach section and these cars run with the bar-end trailing; the elevated section of the last two cars are entirely lounge and these two cars operate with the bar-end leading.

Interior Arrangement

The cars, designed for through service, have no vestibules and are equipped with automatic sliding end doors. Upon entrance at one end of each car, six steps give easy access to the elevated section. This section on the first four cars consists of a coach section with 16 double and 2 triple seats accommodating 33 passengers as well as a lounge section seating 20 passengers on 10 sofas. Both coach and lounge sections are under the glass dome.

The elevated section of the last two cars is entirely lounge, accommodating 54 passengers on 24 sofas. All lounge furniture and coach seats, supplied by Heywood-Wakefield, conform to railroad company specification and design.

Storage lockers are located beneath the elevated floor at each side of the stairwell leading down to the lower lounge. An access door to the space beneath the elevated floor is installed in the stairwell at the opposite end of the car.

A partition, the upper portion of which consists of

safety plate glass, divides the elevated lounge from the lower lounge, the latter also being under the glass dome. Large tinted glass windows with shades are provided at normal height. The lower lounge is equipped with two 4-seat table sections, two large sofas and four cocktail stands.

Decorative Treatment

The lower-lounge side of the partition between the upper and lower lounge is of decorative design consisting of special natural foliage plastic panels, framed in Philippine rattan with plate glass above. The bar front as the opposite end of the lower lounge is paneled with Parkwood and rattan.

The bar enclosure, with service opening to the lower lounge, contains stainless steel bar fixtures below the service opening with lockers and radio equipment above; a back bar consists of a large carbofreeze refrigerator and low cabinets with glass cabinet above. Separate hand washing facilities for the convenience of the car attendant are installed at the back bar. The cabinets and refrigerator are finished in Parkwood and the glass cabinet doors are of natural foliage plastic. There are low loading doors in the bar and in the passageway adjacent to the bar entrance.

A passageway leads from the lower lounge along the side of the car and storage lockers to the entranceway. The entranceway is bordered on one side by the electric locker and on the other side by a combination locker for both automatic door equipment and storage.



Decorative treatment of lower lounge which is also under the glass dome

Interior decorations were designed by Maurice Sands, a local interior decorator. The color scheme is green throughout. Interior walls are moss or grey green, the coach seats are upholstered in dark or jade green and the lounge furniture is upholstered in light green panelled with Parkwood and rattan of dark teak finish. Green carpeting covers the entire floor area except the entrance and passageway and the bar end which is covered with tan and brown marbleized rubber tile. Green carpeting also appears on the sides of the stair wells to the elevated section and on the side of the depressed center aisle in this section.

Basic Structural Changes

Existing cars were stripped of all furnishings, equipment, sheathing, floor, roof and trucks. The basic structures were spliced between holsters to increase their length to 85 ft over coupler pulling faces. On car No. 3606, converted from T&NO car No. 950, the round end was removed and a new extension complete with dummy end applied.

The underframes and side frames were altered and reinforced as required, using high tensile steel. Sides were covered with high tensile steel sheathing and the girder and letter board area covered with stainless steel corrugated sheathing.

Structural crossties were applied at both partitions forming the lower lounge.

A new floor was applied 4 ft 7 1/4 in. above the normal

floor height, extending for a distance of 46 ft 7 in. inside one end of the car to provide an elevated seating area.

This elevated floor has a depressed center aisle 13 in. deep to give overhead clearance below the main air duct.

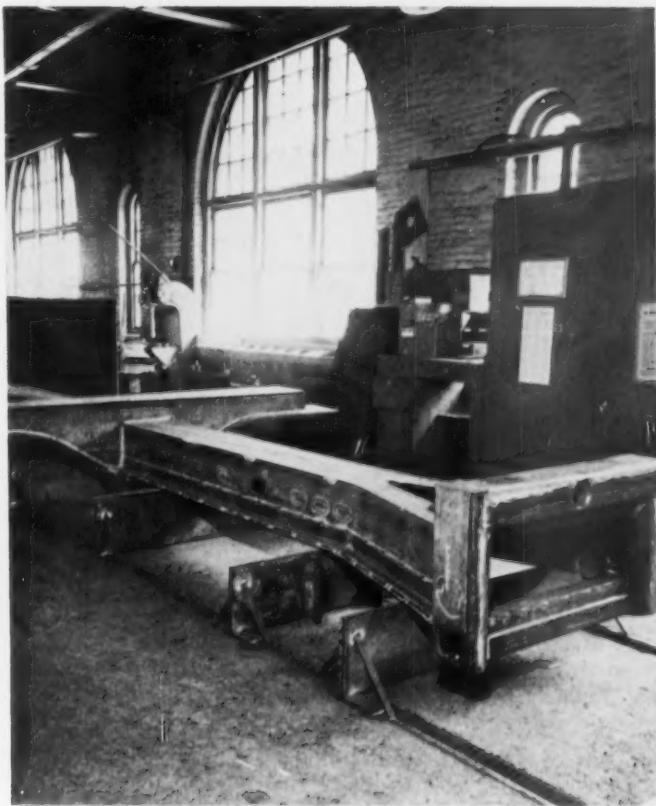
The dome roof structure, 73 ft 4 1/8 in. in length and installed over the elevated and lower sections, was purchased from the Budd Company in a partially disassembled form.

All parts were shipped to Sacramento where they were applied to the car and assembled as a complete roof structure, using the jig illustrated, which greatly simplified this operation.

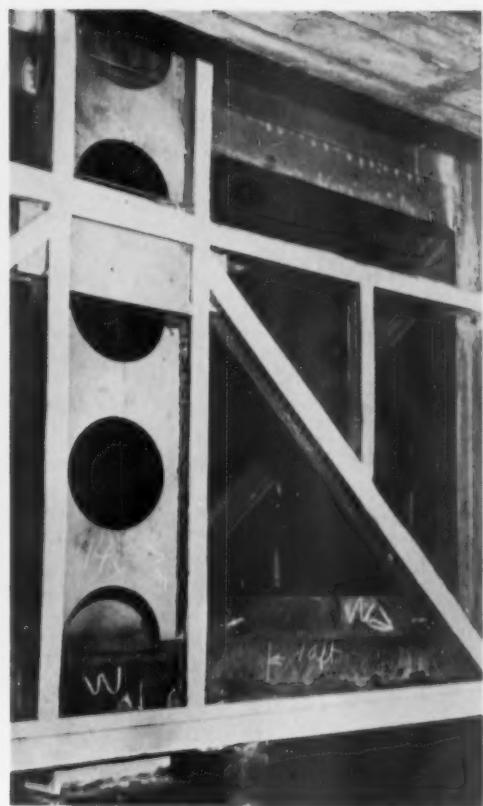
The windshield frame at either end of the roof is molded of reinforced fibre glass plastic, also supplied by Budd.

The dome sash and windshield sash, as well as the conventional sash in the lower lounge and passageway, were made by Adams & Westlake. All sash is double glazed with Solex tinted and tempered plate glass on the outside and laminated non-tempered glass on the inside. There are 48 dome sash in all, 24 per side, 67 7/8 in. long and 30 in. high.

Each windshield consists of one center sash and two wing sash. The inner windshield sash forms the inside face of the conditioned air passage and is hinged to allow access for cleaning the inside of the center windshield sash. To assure satisfactory service without glass breakage, all sash were applied, especially in the dome, with uniform pressure by means of electric impact wrenches.



New body bolster and center sill end, made of welded high-tensile steel



Side frame construction and elevated floor supports

with adjustable clutch set to a predetermined, maximum torque.

The cars are equipped with rubber-cushioned draft gears and tightlock couplers.

Truck Features

Trucks are General Steel Castings four-wheel, light-weight design, having single drop I-beam equalizers, 36 in. wheels, 6-in. by 11-in. Timken roller bearings, helical coil equalizer and bolster springs, cushioned bolster friction snubbers. Cars SP-3602 to 3606, inclusive, are equipped with derailment safety guides with safety clips. Other truck equipment includes outside swing hangers, 24-in. central bearing, Budd disc brakes and Decelostat equipment for wheel slip protection.

Truck noises and vibration are damped by Fabreeka pads applied to top and bottom of bolster and equalizer springs, between equalizer feet and pads on journal boxes and between swing hanger bearing and spring plank.

Brake equipment is Westinghouse HSC type, arranged for 100 psi cylinder pressure operating through truck-mounted Budd design disc brakes. Cars SP-3601 to 3604 are equipped with electro-pneumatic straight air control while cars SP-3605 and 3606 have this feature omitted. The air brake equipment is designed to give a braking power equal to 250 per cent of the light-weight of the cars on rail and a deceleration rate of 3 miles per hour per second.

All cars are equipped with two independent air-condi-

tioning systems, including two Waukesha ice engines with long-cycle control, two full-flooded evaporative condensers and 8 propane fuel tanks which are located underneath the cars.

One cooling unit is located over the bar beneath the normal roof contour to supply conditioned air to the bar, lower lounge, and a portion of the elevated section. The other cooling unit is located at the opposite end below the elevated floor supplying air through ductwork at the end of the car into the overhead air duct for the balance of the car. Both units supply air to the same overhead air duct.

The overhead air duct is equipped with Pyle-National Multivent panels for air distribution downward and Barber-Coleman grilles for horizontal air distribution.

Recirculated air for the bar end is returned to the cooling unit through grilles located in the ceiling just inside the end door entrance way and in the hallway. Recirculated air from the elevated portion of the cars is returned to the cooling unit below the elevated floor through outlets in the elevated floor located beneath the seats which are connected to duct work leading to the cooling unit.

Fresh air is drawn from the outside through Farr filters before being circulated through the cars.

Heating coils, adjacent to the cooling coils of the two cooling units, furnish overhead heat through the same air ducts. Vapor unit-fin radiation is used for floor heat throughout the cars and thermostats at each end of the cars control both floor heat and overhead heat. One Vapor



Tightening dome sash to a predetermined, limited and uniform pressure

automatic control panel with two sets of controls keeps the car at desired temperature under all conditions.

Each car is equipped with a 15-kw, 32-volt d-c axle generator with Spicer drive, a Waukesha 7½-kw 32-volt d-c propane-driven engine-generator and an Edison 25-cell A16H storage battery complete with rollout cradle. The generators are interconnected so that the axle generator will supply electric power when the car is in motion and the engine generator will supply power when the car is standing still.

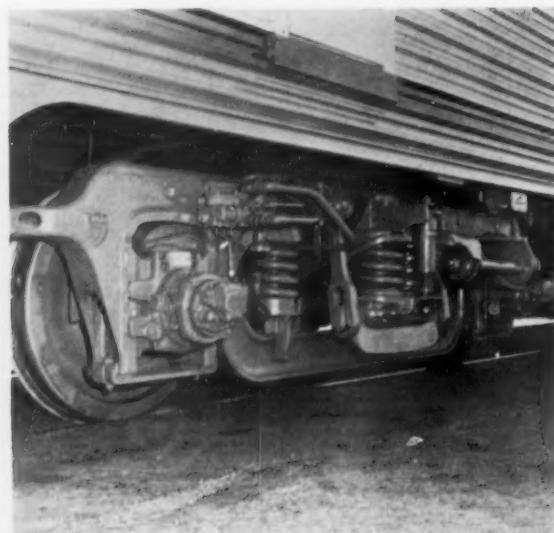
There are two propane cylinders for the engine generator which are for air-conditioning equipment or a total of 10 cylinders per car.

A radio is installed to supply AM broadcasts. Public address announcements and radio programs can be train-lined for adjacent cars as required. Both upper and lower lounges have annunciators.

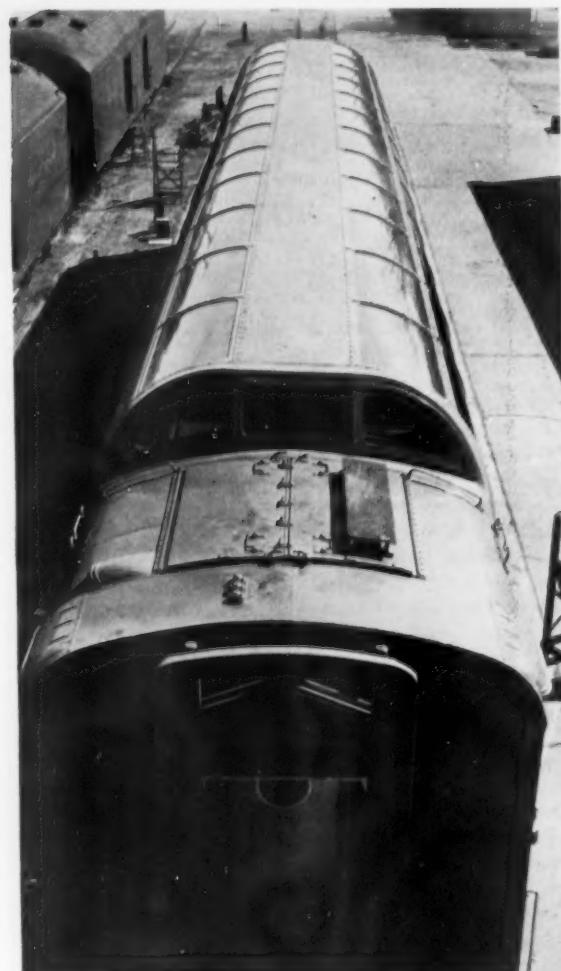
Cars are equipped with incandescent lighting. Twelve flush fixtures mounted in the underside of the overhead air duct are controlled by 3-way switches located in the hallway and opposite end stairway which permit use of half or all of the fixtures as desired.

Aisle-type lighting fixtures are used throughout to illuminate the floors, 13 of which are located in the aisle of the elevated section, 3 at the end stairway, 6 at the middle stairway and 12 in the lower lounge.

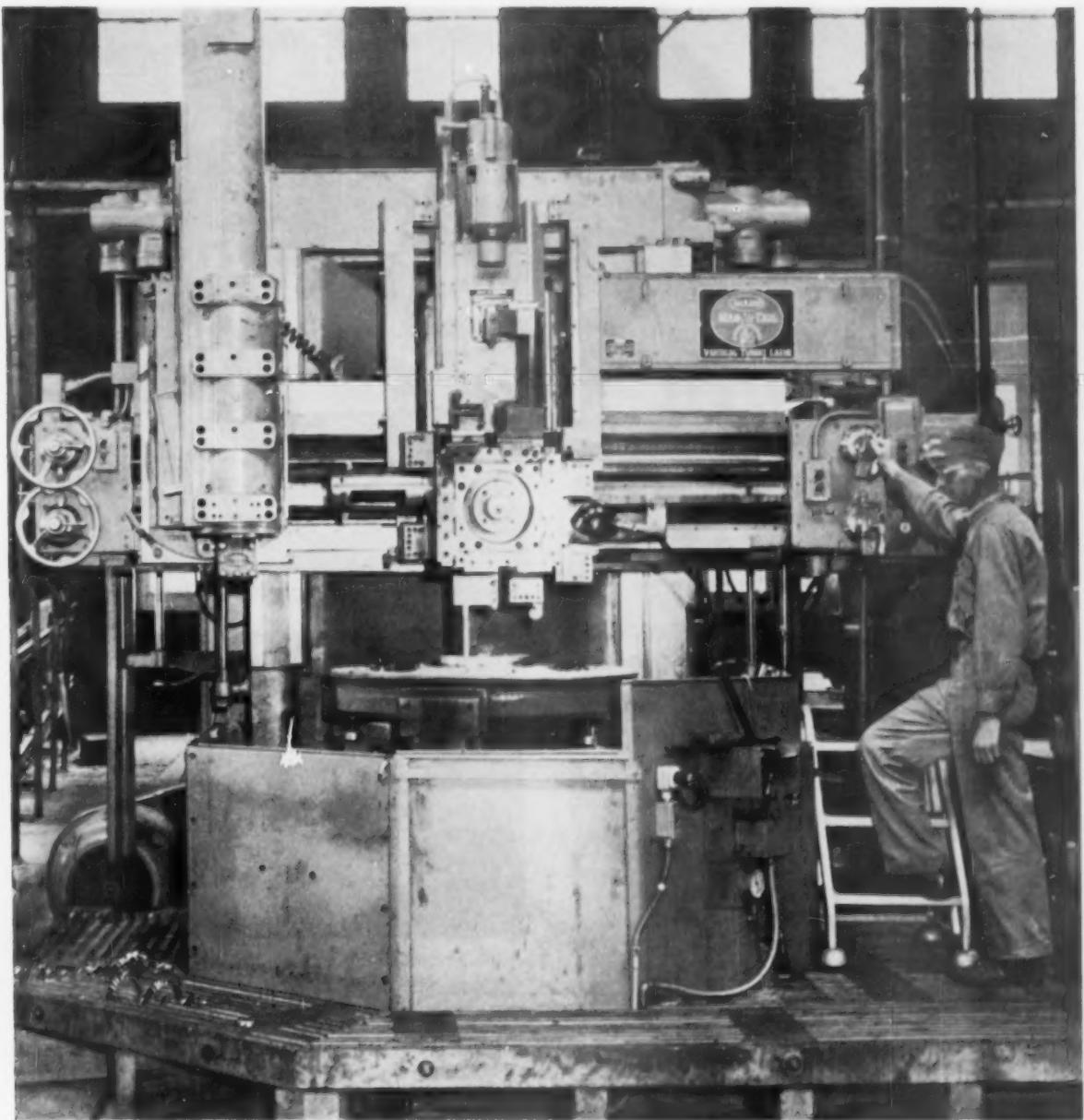
Reading lights with individual control are installed on the side walls of the lower lounge. The plastic foliage panels on either side of the stairway in the lower lounge are illuminated. Special illumination is provided in the bar.



General Steel Castings 4-wheel truck especially designed for quiet, easy riding



The SP dome-lounge-car roof construction includes a hatch in one end of the car



Bullard 54-in. Man-Au-Trol installed for machining diesel wheels at NP shop, Brainerd, Minn.—Wheel delivery chute

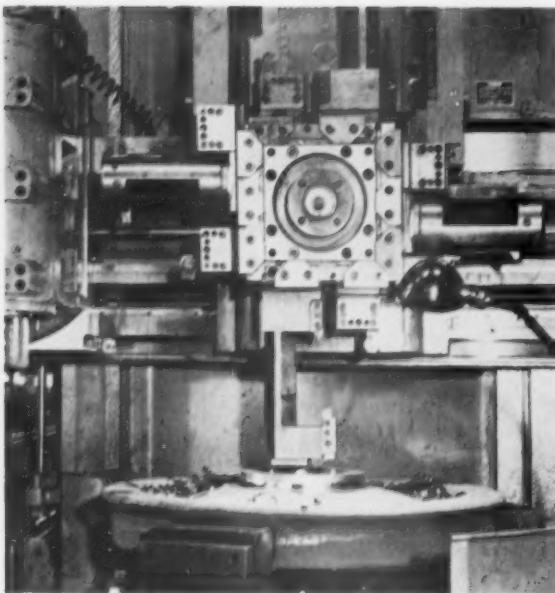
Diesel Wheels Machined Automatically

One new automatic machine not only does twice as much work as three older machines, but finishes wheel hubs to 0.001-in. accuracy

The Northern Pacific has installed at its Brainerd, Minn., locomotive shop a Bullard 54-in. Man-Au-Trol for automatically boring and machining 40-in. diesel wheel hubs at a single setting, with an accuracy of .001 in. and a production of six wheels in one 8-hr shift. This com-

pares with a former production of three wheels a day, using three old-type boring mills.

New diesel wheels for both road and switching power are delivered to the shop where they are picked up with a crane and loaded on a flat car for movement to the

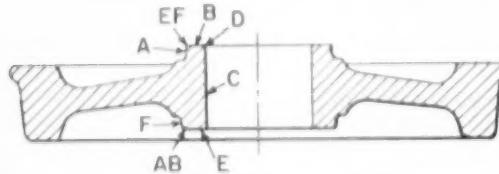


Close-up of tools for turning both hubs at one wheel setting.

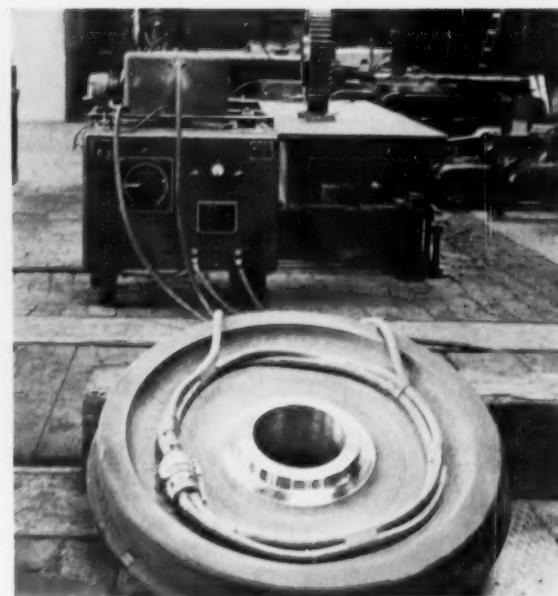
sand house where they are sandblasted on both sides. They are returned to the shop and loaded on an inclined chute, down which they roll at the left of the Man-Au-Trol. A tip-out device permits hooking a single wheel to the jibtrane and moving it to the machine table. Here, it is automatically centered in a large three-jaw hydraulic chuck of special design, and three screw supports applied under the wheel rim (between chuck jaws) for added rigidity and accuracy. After machining, the wheels are Magnafluxed.

This Man-Au-Trol is a Bullard heavy-duty vertical turret lathe with either manual or automatic control for repetitive metal cutting operations. In machining 40-in. diesel wheels, all four index positions of the turret head are used and 39 different functions are available in proper sequences. After accurately setting all tools for the first wheel, no further adjustment of cutting tools is required until they have to be sharpened or renewed on account of breakage which occasionally happens in spite of the greatest care.

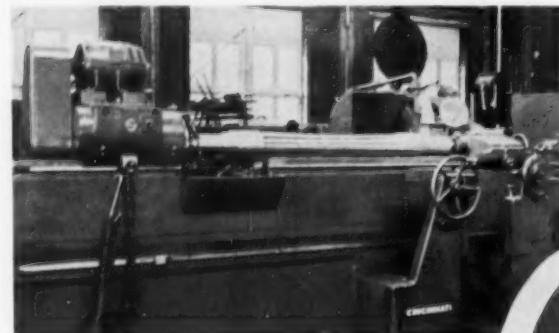
Referring to the wheel cross-section, the various car-



bide-tipped tools are brought into position and cuts made as follows: Rough bore C (1st cut) with .0156 in. feed down and 41.5 rpm; with .0104 feed down, rough turn F at 41.5 rpm and finish turn at 50.4 rpm; with .0156 feed right, rough face E at 41.5 rpm and finish face at 50.4 rpm; with .0104 feed up, rough turn A (1st and 2nd cuts) at 41.5 rpm; with .0104 feed right and up, chamfer AB, rough and finish; with .0104 feed up, rough turn A (3rd cut) at 41.5 rpm and finish at 50.4 rpm; with .0208 feed down, rough bore C (2nd cut) at 50.4 rpm and



Equipment used in Magnaflux testing diesel locomotive wheels.

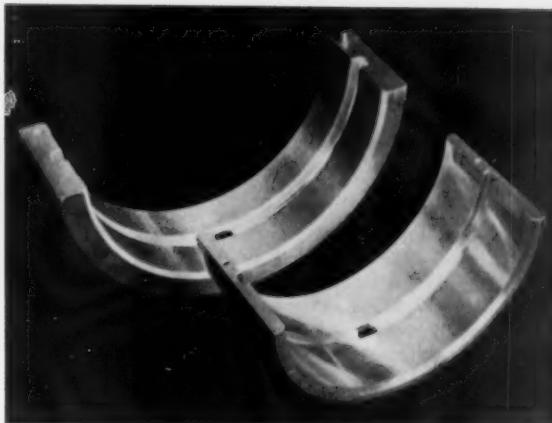


Finishing roller-bearing journal and dustguard seat on a modern Cincinnati 144-in. grinding machine at Brainerd shop.

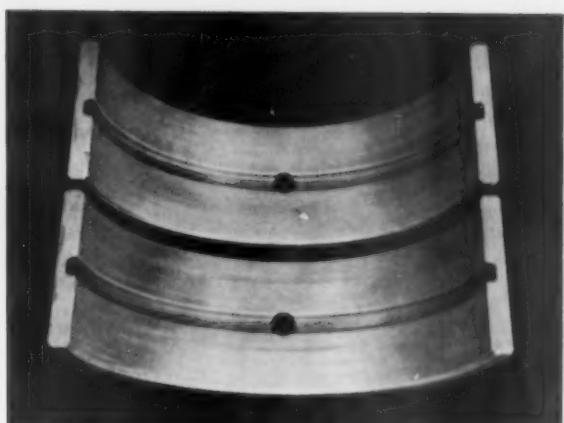
finish at 35.6 rpm; with .0156 feed down, rough turn F and chamfer D at 50.4 rpm and form radius D and break EF at 35.6 rpm; with .0156 feed right, rough and finish face B at 60.8 rpm.

After finish machining the upper and lower hubs, as well as the bore, wheels are carefully examined for defects or any minute cracks which may have been uncovered by cutting away surface metal. This operation is performed with a Magnaflux test machine, magnetizing coil and dry powder as shown in one of the illustrations. After checking the other side, the wheel is ready for mounting on an axle.

Both passenger car and diesel axles have roller-bearing journals and waterguard seats ground in the Cincinnati 144-in. grinding machine, the $\frac{3}{4}$ -in. fillet between the two surfaces being formed by the rounded corner of the grinding wheel. In the case of power-driven diesel axles, the motor support bearings also are ground and the total time averages about $3\frac{1}{2}$ hr per axle. The grinding time for non-power axles averages 2 hr and in this case the taper centers are finished between wheel seats with a pneumatic buffing wheel in an engine lathe.



Solid aluminum bearings as furnished to locomotive builder.



Solid aluminum bearings after a year's service in a locomotive engine

Engine Bearings of Aluminum

By D. B. WOOD

Head of Bearing Section
Cleveland Development Div.
Aluminum Co. of America

Solid aluminum alloy bearings made from castings furnished by the Aluminum Company of America have been in use for the past eight years in locomotive engines used by most of the railroads in this country. While such bearings are relatively new when compared with the history of bearings made of other materials, every indication from field service points to the fact that, with proper design and installation, they will take as much or more abuse as other bearings. Solid aluminum alloy bearings are unique in their field in that they are the only mono-metal bearings that can operate under heavy or high-duty requirements.

The basic advantages of solid aluminum bearings have been definitely proved in road service, substantiating previous assumptions founded upon laboratory test work.

In general the advantages of solid aluminum bearings can be listed as:

1. Resistance to damage of journal or adjacent parts in the event of failure.
2. Excellent resistance to corrosion.
3. Ability to carry heavy loads.
4. High thermal conductivity.
5. Conformability to misalignment.
6. Adaptability to various designs and types of applications.

In designing aluminum bearings, there are relatively few points for consideration. Running oil clearance and crush stress are probably the most important. In some measure, the crush stress influences oil clearance at operating temperature owing to such reduction in clearance as may result. Therefore, these two points will be considered together.

When aluminum bearings are used in ferrous housings

and the ultimate operational temperature is high, careful and thoughtful analysis should be made of bearing crush requirements at installation temperature. Aluminum bearing alloys have a coefficient of thermal expansion approximately twice that of ferrous materials. This gives a differential expansion in the neighborhood of 0.00000065 in. per in. of length per degree F. Where aluminum bearings are used in aluminum housings, this differential expansion is eliminated.

By tests on actual connecting rods taken from large diesel engines and backed by experience in use, it appears that a crush stress of approximately 5,000 psi is desirable. This assures that the bearing is firmly seated in its housing and, depending upon the alloy selected, allows for reasonable temperature increase without the bearing becoming loose in the housing from permanent deformation as a result of high stress caused by elevated temperature.

A recommendation is usually made to use an oil clearance of 0.0015 in. per in. of journal diameter where the bearing shell is concentric or uniform in wall thickness. When eccentric or taper wall bearings are used, an oil clearance of 0.00175 in. per in. of journal diameter is specified across the parting line of the bearing and 0.00125 in. per in. of journal diameter at right angles to the parting line surface at the bearing crown.

The above-mentioned figures refer to split-type bearings (usually two half shells) under reciprocating load conditions similar to normal engine bearings.

It is possible to reduce the figures given above for oil clearance by proper preparation of the journal or mating bearing surface and by adequate oil supply and filtration.

Many of the problems relating to crush and clearance can be reduced by the use of full floating bearings. Where design and installation do not present unsurmountable obstacles, solid aluminum lends itself naturally to this type of bearing because of its simplicity of fabrication.

(Continued on page 49)



Allied Railway Supply Association
D. F. Hall, president



C. F. Weil, secretary

RAILROAD MEN—NOTE!!

Because of the great numbers of visitors to Chicago in connection with the Machine Tool Show and other conventions, reservations for hotel space must be made as early as possible. Some who have asked for reservations have had their request returned. It is important that all railroad men requesting reservations for the Coordinated Meetings specifically mention The Coordinated Meetings or the Allied Supply Association Exhibit in making their requests. The reservations office of the Hotel Sherman will, in so far as it is able, find accommodations for railroad men attending these meetings if requests are made sufficiently early.

September's the Big Show

Coordinated Mechanical meetings, Allied exhibits, and Machine Tool Show to offer mechanical men rare opportunity in Chicago

The old saying that "All roads lead to . . ." is certainly going to be true of Chicago, come this September. For there, on September 12, 13 and 14, after an absence of two years will be the three-day meetings of the Coordinated Mechanical Associations—Car Department Officers', Locomotive Maintenance Officers', Fuel and Travelling Engineers' and the Air Brake Association—at the Hotel Sherman. The Master Boiler Makers'

we regret to say will, as a separate association, be missing this year, it having disbanded and joined forces with the Locomotive Maintenance Officers. This too is the year of the exhibit of the Allied Railway Supply Association and, on top of all this as an extra dividend to railroad men there is the "Biggest Show of All"—the Machine Tool Show of the National Machine Tool Builders Association together with the Production



National Machine Tool Builders' Association Machine Tool Show Committee. Back row: J. C. Herbert, Jones & Lamson Machine Co.; D. H. McIver, Ex-Cell-O Corp.; Frank Moran, Carlton Machine Tool Co.; S. A. Brandenburg, Monarch Machine Tool Co.; B. A. Gustafson,

Sundstrand Machine Tool Co. Front row: W. E. Rutz, Giddings & Lewis Machine Tool Co.; M. A. Hollengreen, Landis Tool Co.; and F. U. Hayes, The Bullard Co. E. P. Cunningham, Clearing Machine Co. and Tell Berna, general manager, NMTBA, are missing in picture.

Engineering Show, these to be held simultaneously in Chicago from September 6 to 17 inclusive. This year any railroad mechanical man can well afford to plan for a few extra days in Chicago outside of the three days of the Coordinated meetings to avail himself of the opportunity to get a liberal education from the exhibits of 326 manufacturers at these two shows showing the latest in modern industrial machining equipment and devices which make possible the enormous output of our automotive and industrial plants. The Machine Tool Show will be held in the International Amphitheatre to which a new Exhibition Hall has been added to accommodate the show; the Production Engineering Show will be held on the Navy Pier. What will probably strike visitors to the Machine Tool Show as most impressive will be the amazing progress made in the last few years in the development of automatic operations and controls. There are said to be 441 distinct types of machine tools—not to mention various sizes and combinations.

Practically all of these will be on display at the Show, and to make it more interesting, in operation.

The railroad equipment exhibit, at the Hotel Sherman, under the direction of D. F. Hall and C. F. Weil, president and secretary, respectively, of the Allied Railway Supply Association will, it is expected, be the largest one held in connection with these meetings. While, at this early date, it is not possible to say exactly how many companies will be exhibiting at Chicago there are, this year, many more exhibit booths available than has been the case with past exhibits because of expansion of the exhibit space at the Hotel Sherman. There are approximately 350 booths of various sizes available.

This year the Chicago meetings will be covered by daily editions of *Railway Age* and *Railway Locomotives and Cars* on Monday, Tuesday and Wednesday.

Advanced programs of such of the September meetings as are available at press time will be included in the August issue.

Engine Bearings of Aluminum

(Continued from page 47)

Probably the next most important design consideration is the method or device used in locking or fixing the bearing in its position in the housing. Over the years, various methods have been devised and used to accomplish this. When aluminum is being considered, it should be remembered that a device which provides maximum resistance to turning without restrictions that would result in high stress concentrations in certain areas or portions of the bearing is most appropriate.

The next item for design consideration is the finish of the journal or mating surface and the finish of the bearing itself.

The following general statements may best outline the optimum requirements.

... Bearing finishes obtained by cutting with a sharp tool are the best, even though the surface finish in measurable RMS (Root mean square, obtained by a Brush profilometer) is higher than for a surface obtained from a dull tool or one so designed that some degree of burnishing is done with the cutting operation. The above remarks apply also to journal finish or other surface of bearing.

... Final journal finishes should be obtained with a machining setup that does not allow irregularities to be present in the surface, or if this is impossible to control, then other measures should be adopted to insure an even surface plateau. It may be beneficial to super-finish and subsequently lap to obtain the results desired. The super-finish controls the plateau of the surface and thereby avoids sharp peaks; subsequent lapping leaves only voids in the surface, thereby probably increasing wettability, oil retention and reducing starting friction. Too low RMS (Root mean square, obtained by a Brush profilometer) finish may restrict wettability, oil retention and increase starting friction.

... Grinding on aluminum bearing alloys should be done with caution so that grit may not be left in the surface of the bearing.

... In some rare instances, it may be necessary to electro-plate the bearing surface. Depending upon the

conditions of operation, such an overlay can be from 0.0005 in. to 0.020 in. in thickness.

... Once the design and fabrication of the bearings have been established, the next most important detail is the actual installation in the engine.

... Cleanliness is certainly of utmost importance where engines are concerned. It may seem superfluous to mention things which are familiar to those who are so intimately connected with engines, yet too much emphasis cannot be placed upon engine cleanliness. Every engineer and shop foreman knows what good practice is—it is merely the desire and will to produce a superb machine.

... Bearings should be handled with care as dropping, nicking and hammering do not improve any bearing. When bearing caps are being torqued up, it is good practice to check the alignment of the two half shells at the parting line face to see that they do not overlap. A rough check on crush stress can be made at the time of installation. The easiest way of doing this is to bring the cap in position and draw up the bolt or stud nut tightly with the fingers only. A feeler gauge inserted between the cap and the housing will give a dimension from which crush stress can be calculated.

... A check should be made on oil clearance as well as total end clearance so that ample space is provided for increased bearing length at higher temperature.

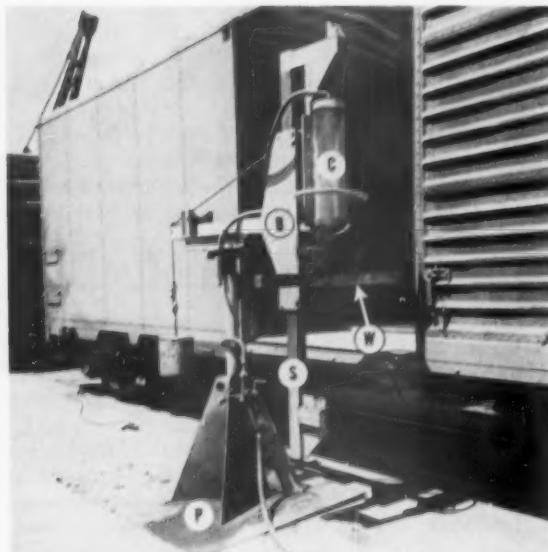
... The foregoing does not imply that solid aluminum bearings should be considered for heavy or high-duty applications only. In medium and light service, they work equally well and for new designs provide the opportunity to reduce physical dimensions.

As an example of the foregoing, one of the foremost locomotive builders decided some time ago that solid aluminum bearings might be a forward step in its desire to furnish customers with the finest obtainable product.

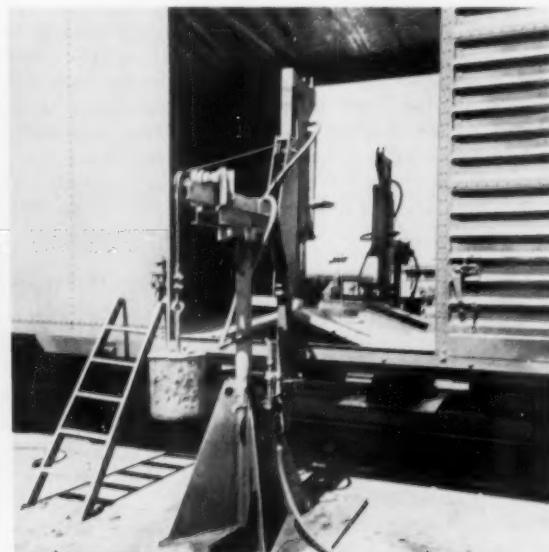
After a few years of proof testing in its own laboratories and in engines on the road, this manufacturer adopted solid aluminum bearings for production.

Considerable time and money as well as the ingenuity of its engineers and the understanding of its management were required to reach the degree of perfection finally achieved and now available as a standard part of their engine.

Ideas for the Car Repair Man...



Swung out of position to allow the box car production line to be moved, this air press quickly swings into the operating position once the door opening of the car is spotted and the decking has been placed throughout the length of the car.



Two of the air presses, one extending through each door opening, have lower jaws bearing against the underbody of the car and upper jaws holding wood members against the pyramid assembly which then applies necessary pressure to the car floor.

FREIGHT CAR DECKING PRESS. The pneumatic decking press, illustrated, is giving exceptionally good results saving time and labor in the application of freight car floors at the Southern Pacific car shops, Sacramento, Cal. The flooring is applied easier, safer and tighter than by former methods which involved considerable manual labor and hand jacking.

The decking press (one on each side of the car) is located at the floor-application position in the freight-car assembly line. It is mounted on a 4-ft. by 5-ft. by $\frac{3}{4}$ -in. steel base plate *P* with four welded gussets supporting a 4-in. by 6-ft. central pipe which has a horizontal bar and vertical guide bracket *B*. A 6-in. by 32-in. outboard cylinder *C* with 26-in. stroke carries a 42-in. by 3-in. by 3-in. wood pressure member *W* attached to the piston end. Cylinder *C* is mounted on a welded steel construction having vertical movement by means of 4-in. square bar *S* in guide bracket *B* and a jaw at the lower end of *S* to contact the car underframe when swung into the operating position.

The horizontal member of bracket *B* and also the vertical bar *S* are 4-in. squares, made by welding two 4-in. angles together. The weight of the cylinder and its supporting steel framework is balanced as shown by means of a steel cable operating over pulleys and connected to a lead counterweight. The entire device swivels easily by hand on the vertical 4-in. central pipe and has a spring

loaded pin stop to hold it in any desired position. Horizontal adjustment of the cylinder and supporting bracket *B* are also easily made by hand.

In operation, therefore, the car is loaded with the required amount of decking at the previous position and then moved to the position shown with doorways opposite the two decking presses. Decking is placed loosely in the car leaving out two boards at the center so that hand ratchet jacks can be used to take up slack. The open space is measured and two double-grooved boards selected having $\frac{1}{2}$ to $\frac{3}{4}$ -in. greater combined width, dependent upon moisture content of the boards and the amount of tightness desired in application.

Two pyramid floor formers are then made, each consisting of 5 boards nailed to 2-in. angle iron cleats 24-in. long. These pyramids are then applied at the center of the car floor. Each decking press is swung into position and pushed into the car door with the lower jaw directly under the car underframe and the wood pressure member *W* bearing on the apex of the pyramid. Application of air to the two cylinders brings the lower jaw up against the car underframe and continued application of the pressure forces the pyramid floor frames to a horizontal position ready for nailing.

The release of air pressure permits easily pulling the pneumatic presses out of the car doors and swinging them into the clear ready for the next car.

ELECTRICAL SECTION



General view of the shop.

Overhaul of Undercar Power Plants

■ Overhaul of any railroad car or locomotive equipment usually consists of removing it from the vehicle to the shop, dismantling it, cleaning the parts, replacing or restoring parts to essentially new condition, reassembling the equipment and putting it back in service. Engine-driven generator and compressor sets have many parts, but when the work is well organized the maintenance procedure becomes relatively simple.

The Southern Pacific does this work in three shops, one at Los Angeles, Calif., one at Sacramento, and one at Bayshore. The illustrations shown here were all taken at the Sacramento shop. Most of the work in this shop is done in one corner of a building, in a space 41 ft wide by 110 ft long. An average of 22 units is overhauled per month. Ice engines or compressor units are overhauled about once in nine months and engine-generator sets at six-month intervals.

When an ice engine is to be overhauled, the refrigerant is removed from the system, and the unit moved from the car to the shop on a fork lift truck.

The engine is put on a dolly and remains on it through

Southern Pacific has reduced maintenance of propane engine-driven generators and air conditioning compressors to the least common denominator

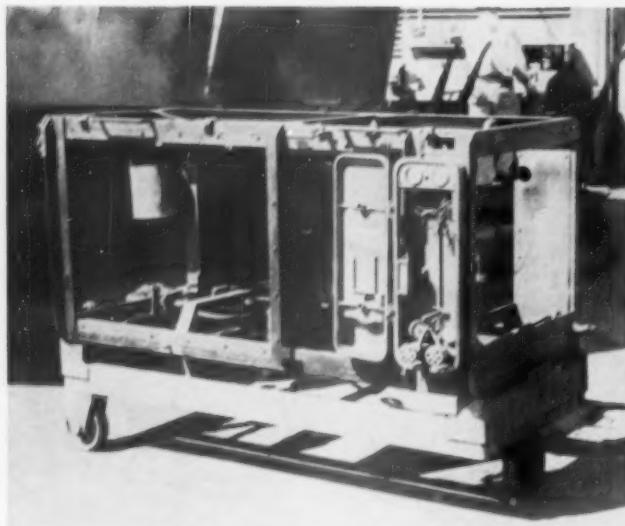
the process of overhaul. The engine radiator and ice-engine condenser are removed and steam cleaned.

Both ice-engine and engine-generator units are completely disassembled, and all iron and steel parts are cleaned in a hot detergent. Another type of hot solution is used for brass and aluminum parts. This includes radiators and condensers.

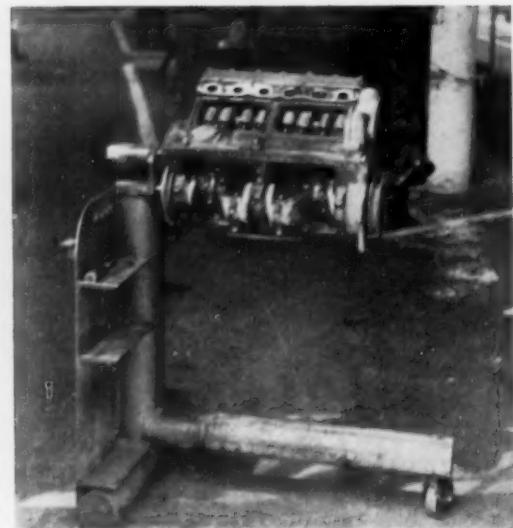
Engine Overhaul

After cleaning, cylinders are gaged and honed if necessary. If scored they are rebored and fitted with oversize pistons. Two oversize pistons are used, one 20, and the other 40 thousandths of an inch over standard.

New piston rings are applied and valves are ground. New valves and seats are applied if necessary. Valve



The frame of a set remains on a wheeled dolly as the work of overhaul proceeds through the shop.



Engines remain on a wheeled stand during overhaul.

guides are always renewed. The use of roto valves has increased the life of valves and seats and reduced the amount of grinding required.

Crankshafts are all hard chromium plated. This permits running a crankshaft through two overhaul periods. Cam shafts and cam shaft bearings require little maintenance and there is little need for new tappets. Connecting rod and piston pin bushings and main bearings are renewed on each overhaul.

Water pumps are provided with new seals and bushing. Oil pumps are tested and, if in need of repairs, they are supplied with necessary parts. They are tested on a stand to see if the pump will produce a pressure of 85 psi when running at normal speed.

Special instruments are used to measure distributor resistance, engine performance and fuel consumption. Air cleaners are cleaned, but otherwise need practically no maintenance.

Compressors

Compressors are given new thrust bearings if necessary. Crank shafts are hard-chromium plated. They are fitted with all new bearings. Cylinders are honed if necessary and pistons are fitted with new rings. Valves are disassembled and valve plates are ground and reassembled. New pins and bushings are seldom required.

Crankshaft seals are ground to a mirror finish until they will adhere to each other.

Fan assemblies are disassembled and fan bearings are replaced when necessary. Outboard or compressor drives are disassembled, and the drive shaft fit is built up with acetylene welding and remachined. The spacers for seal bearings are replaced and ball bearings are removed if necessary. Air flow fans and idler pulleys receive new bearings if necessary.

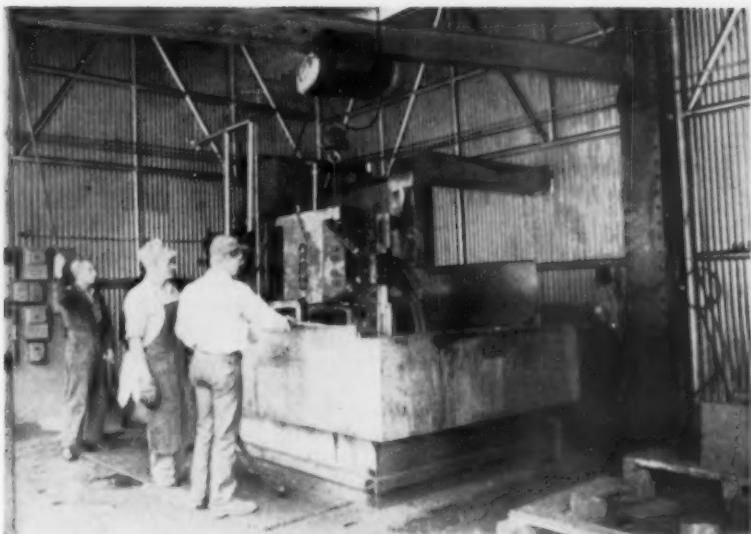
Bearings are tested by spinning and new (no reclaimed) bearings are used for replacements. Overhauled compressors are run on a stand for about four hours to seat the crank shaft seal, and then a vacuum of 26 to 27 in. is pulled on the compressor. The vacuum must hold for eight hours, and if it does not, the system is then charged with freon and the leak located with a leak detector.



Bench for overhauling and testing starters, vacuum switches, oil pressure switches, temperature switches and high- and low-pressure switches.



Panel overhaul and testing bench.



The degreaser is housed in a building which is open on one side. This avoids any accumulation of vapor and prevents strong drafts which might lift vapor from the tank.



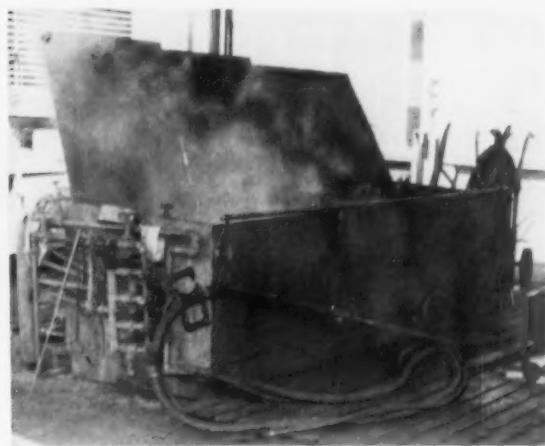
Cleaning tank for bearings.



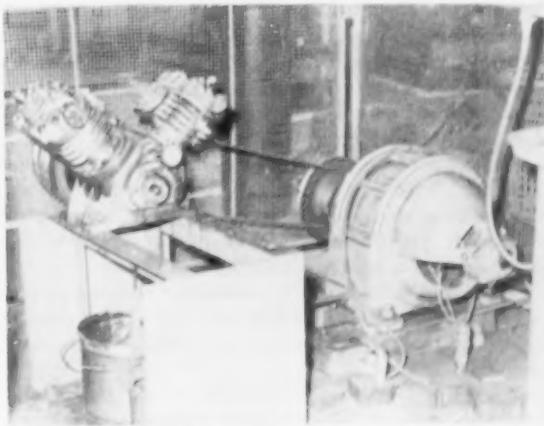
Overhaul bench for propane-driven engine generators and engine-driven compressors.



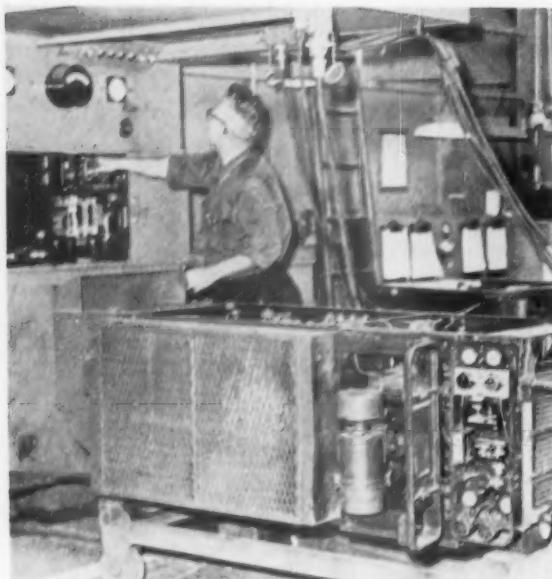
Springs for supporting rollers are removed and applied with this spring compressor.



Hot detergents are used for cleaning metal parts.



A compressor under test in the shop.



A completely reconditioned set is tested on one of the shop control panels.

The generators come off as a unit, and are dismantled and cleaned in a vapor degreaser with trichlorethylene. All wiring is checked and coils are replaced if necessary. All coils are reinsulated with brush-applied insulating paint.

Brush rigging is cleaned and adjusted and all new brushes are applied. The generator bearing and oil seal are usually replaced.

The engine-generator coupling is fitted with new pins and bushings. The bushings are bronze and the pins are steel.

Leads to the generator are replaced. Brush holder bushings and insulators sometimes need replacement. Starting resistors are taken apart and nickel-plated before being reassembled. Commutators are turned and undercut. The insulation resistance of the overhauled unit is measured with a 500-volt megohm insulation tester and must show a resistance of three megohms.

The ice engine starter and all wiring are removed. High- and low-pressure switches are removed and overhauled. Oil-pressure switches, vacuum switches and by-pass solenoids are checked and set. If damaged, they are replaced. Wiring is overhauled and new wire applied where needed. Selenium rectifiers are checked for output. Plugs and receptacles for ice engine to car connections are disassembled and the contacts checked.

Control panels are overhauled in a separate shop where all instruments are checked and reworked. Replacements consist mostly of starting switch contacts, and mercury control switches. The control panel is completely overhauled and checked for operation.

When a unit is completely overhauled and reassembled, it is run under load and tested with one of two standard control panels which are mounted on test boards in the shop.

The shop also handles all types of air conditioning equipment on cars, electric water coolers, axle generator drives and portable power plants.

Australian Electrification Starts Operation

■ The first stage of electrifying the main line railway between Sydney and Lithgow, in New South Wales, Australia, is now complete. In February, 1955, the first section, between Parramatta, in the suburbs of Sydney, and Blacktown, was opened to traffic as an electrified line. It is expected that the second section between Blacktown and Penrith will be electrified by September of next year, and the final stage to Lithgow by the middle of 1957. Altogether, 82 route miles, including 232 miles of track will be electrified.

A considerable amount of electrification was carried out in Sydney and its suburbs between 1926 and 1951. The present change-over from steam to electric traction has been necessitated by increasing freight traffic, which must be moved on grades up to 3 per cent.

The 1,500-volt d-c system is used and all motive power will be equipped for regeneration.



THREE ORE UNLOADERS AND A CONVEYOR SYSTEM ON THE CANTON RAILROAD ORE PIER AT BALTIMORE, MD. The Cottman Company unloader in the foreground was designed and built by Heyl and Patterson, Inc., Pittsburgh, Pa. The 1,136-ft long conveyor, running the length of the pier and the onshore weigh station, as well as the unloaders, were added last year to increase capacity. Since then, the new facilities have been able to unload two ships in the time it formerly took to unload one.

The unloaders are powered by General Electric motors and controls, and the long conveyor belt on the right side of the pier is driven at a speed of 545 ft per min by a G-E 250-hp wound rotor motor, operating at 870 rpm. It can carry 3,000 long tons of ore per hour.



Good illumination with freedom from platform obstacles is shown in this night picture.

Catenary System for Platform Lighting

By C. G. NELSON

Assistant Electrical Engineer
Great Northern Railway

■ The Great Northern has devised a lighting system for passenger platforms at its Havre, Mont., passenger station which provides well distributed illumination with very few supporting poles.

The old low-mounted lighting system has been replaced by a completely new incandescent lighting system employing 40 Line Material Spherolite luminaires which illuminate the full platform length of 1,500 feet required for the long passenger trains.

The platform between east-bound and west-bound tracks is 8 ft wide and the reduction of the usual number of supporting poles minimizes baggage and express handling obstacles. Poles are spaced 300 ft apart with 4 Spherolites in each of the 5 spans, suspended from a $7\frac{1}{16}$ in. guy strand. Power supply wires are also suspended from the messenger. Fixture mounting height is 28 ft.

Calculations showed that the end poles would be deflected inward $2\frac{1}{2}$ in. under the anticipated 6,000 lb loading. Therefore, these poles were installed offset so that the loading would return them to vertical. In designing this inherent compensation into the system, the engineers improved the installation appearance and allowed for the extreme temperature variations at Havre. During the summer months, the poles remain virtually vertical, but during winter months, each end pole is deflected inward $1\frac{1}{2}$ inches due to guy strand contraction.

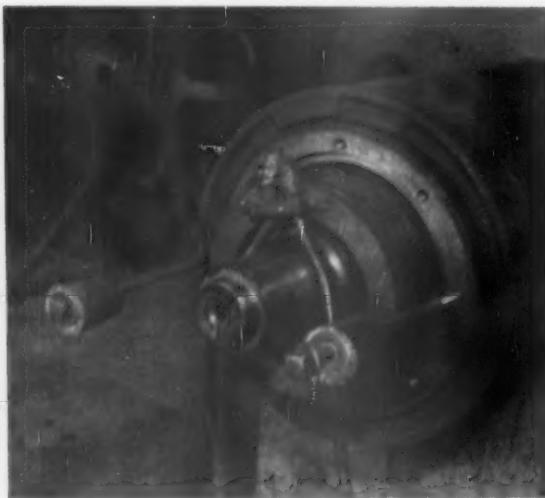
The 20 luminaires on the station-side platform, shown



The catenary supports are used on the full length of 8-ft platform between tracks and along the far end of the station platform. Bracket type supports are used on the station building and along the end of the station platform shown in the foreground.

at the left in the illustrations, are aligned by using three different types of mountings. Six luminaires are supported by 4-ft brackets attached to steel poles, 4 are mounted on 15-ft brackets attached to the station building, and 10 luminaires are suspended from another catenary support. The design features of the two catenary supports are similar, except the station-side support has five Spherolites per span.

Equipped with 500-watt incandescent lamps, this 40-luminaire system provides an average lighting level of 1.93 footcandles on the two platforms. The four luminaires attached to the building provide Type II light distribution patterns, whereas all the others provide Type I patterns.



Heating coil and striking weights applied ready for removal of inner bearing race and flinger



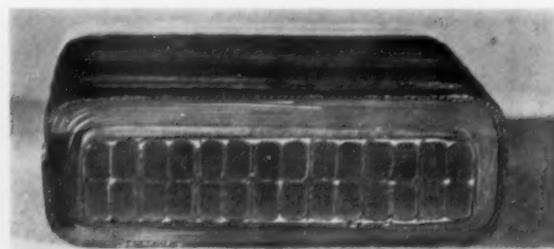
When the race and flinger have been heated, the coil is taken off and the operator uses the striking weights as shown

Easy-Off for Inner Races

■ A method of removing the inner races of pinion-end, traction-motor bearings, developed in the Marion, Ohio, shops of the Erie, makes the job a quick and easy one.

The armature is placed on a stand in a horizontal position, and a shop-made induction heating coil is placed over the inner race, after the bearing has been removed. Two 12-in. bolts are screwed into opposite holes of the inner bearing cap. On each of these bolts is a 2-lb conical weight which slides freely on the bolt.

Sixty-cycle current is applied to the coil which heats the race and flinger to a sufficient temperature in two minutes. The operator then pulls the weights toward himself, striking them against the heads of the two bolts. A few taps bring the race and flinger off the armature shaft.



Instead of a series of insulating layers built one on top of the other, Silco-Flex is vulcanized into a homogeneous mass surrounding the conductors

Motors Insulated By All-Silicone Rubber

■ A new all-silicone-rubber insulation system has been made possible by some recent improvements in the physical and electrical properties of Dow-Corning's Silastic in conjunction with new procedures developed by Allis-Chalmers. The result is a new motor insulating system termed Silco-Flex which is usable for all Class H insulated form wound coils and for Class A and B windings operating under certain service conditions. The following characteristics are expected:

HEAT RESISTANCE: The dielectric and mechanical properties of silicone rubber do not change significantly with aging at high temperature over long periods of time, even up to 250 deg. C (482 deg. F.).

MOISTURE RESISTANCE: Water absorption is insignificant, with little or no effect on dielectric properties. Surface resistance remains high under moisture-condensing conditions that cause many insulations to flash over.

ABRASION RESISTANCE: Higher to abrasive dusts than most other insulations.

CHEMICAL INERTNESS: Withstands most atmospheric contaminants, corona and weathering, also weak acids, alkalies, and lubricating oils.

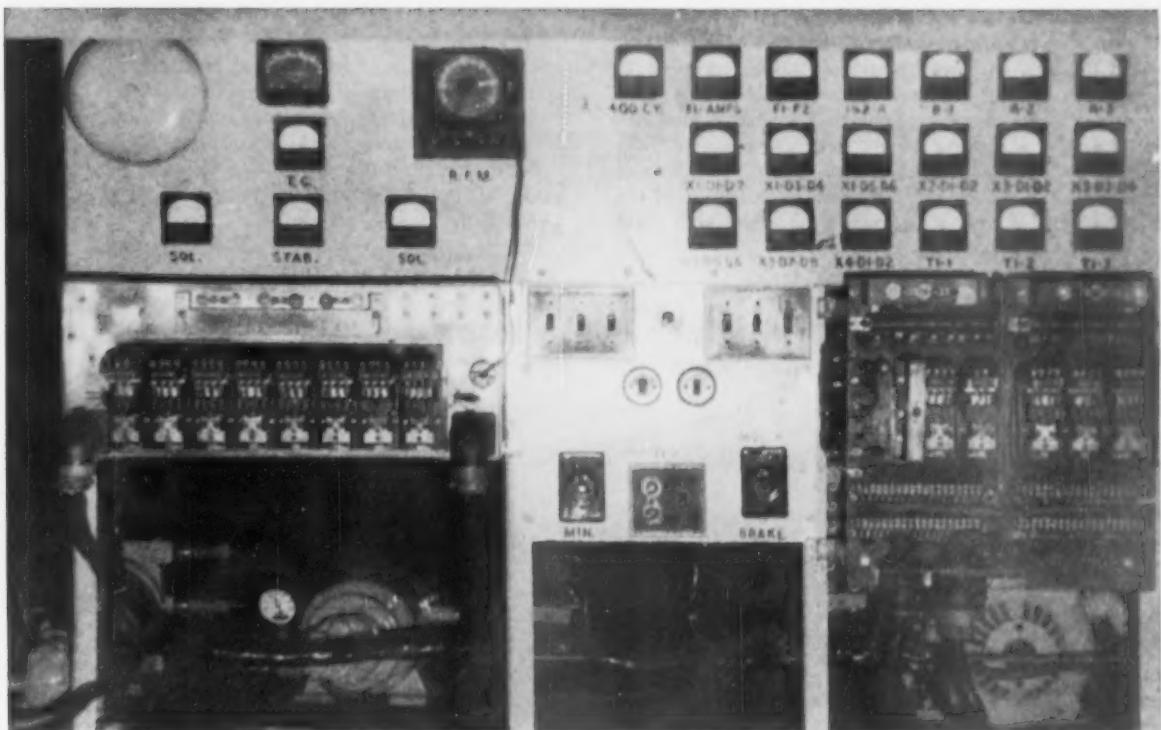
IMPROVED HEAT DISSIPATION: Cooler operating windings result from the high thermal conductivity of silicone rubber.

The first use of Silco-Flex was on insulated stator coils, in which the silicone rubber is applied to conductors, and vulcanized into a homogeneous mass by the application of controlled heat and pressure. The result is a sealed, dielectric barrier, continuous around the coil and leads, which forms a flexible, moisture and heat-resistant wall over the entire coil structure.

The application of this new insulation by Allis-Chalmers is currently being limited to motors of 1,000 hp and over operating at voltages from 2,300 up. As production is increased, its application will be extended to motors and generators of lesser voltage and horsepower.

The possibility of eventually using this all-silicone insulation on diesel traction motors or generators will depend partially on its greater electrical strength.

A second factor that might determine applicability for railroad usage is the feasibility of repairs. Small shops would not probably be equipped to make repairs, but it might be practical to handle such jobs in the larger shops. The repair is made by gouging out around any break and vulcanizing in a new section.



The meters with the control switches provide all the information needed to show that each part of the equipment is in perfect operating condition

Test Stand Measures Actual Values

■ Rather than rely on comparison tests which must assume that one piece of equipment is in faultless condition, a test stand has been developed in the Baltimore and Ohio's Glenwood, Pa., shops which uses actual values of volts, amperes, rpm, etc., to determine the condition of a piece of equipment. The stand is used for testing No. 105 and No. 110 General Electric control panels, governors, tachometer generators and 400-cycle motor generators for types FA2 and FB2 Alco-GE locomotives.

The testing equipment includes a G.E. type 17FM105 B4 panel, a type 17 FM 110 D1 panel, a type 17 MG6 governor, a tachometer generator, a 400 cycle mg set, a type CP3007 air motor, the necessary meters and switches and wires to connect the listed equipment. This duplicates the control and excitation equipment on a locomotive.

Operating current is generated by a d-c motor generator set at 74 volts. Compressed air for operating an air motor is supplied through a valve which is controlled by the governor. The air motor simulates the speed of the locomotive. A multipoint switch, used as a throttle, energizes the various relays on the 110 panel and the speed of the air motor is controlled by the governor through the tachometer generator which is driven by the air motor.

The tachometer generator supplies current through the 110 panel to control the operation of the speed solenoid in the governor.

Separate excitation for the 105 panel saturable-core reactors is supplied by small dry-plate rectifiers and the



The test stand operator makes a complete record of voltages, currents, speed, etc.

same conditions are set up as found on a locomotive in operation. Known values of currents and voltages, found through trial and actual operation, are used to determine if the equipment on the panels is in proper adjustment and operating condition. These values are measured by a number of voltmeters, ammeters, milliammeters and an electric tachometer. The voltage drop of each reactor is indicated by meters. Also measured are the voltages of rectifiers, amplidyne field and main

generator field current, speed-solenoid, stabilizing current, tachometer generator output voltage, 400-cycle mg voltage, and voltage and current relations of reactors, rectifiers and resistances.

Some required test currents and voltages were supplied by the manufacturers. Others were developed by actual operations. The equipment makes it possible to test all parts of the equipment before it is placed on the locomotive.

From the Diesel Maintainer's Note Book

Only Place Where Trouble Could Be

By Gordon Taylor

■ A three-unit diesel locomotive composed of three GP-7 EMD units, popularly called jeeps, arrived at one of the smaller terminals with all units presumably working okay. The units were serviced with fuel and were made ready to dispatch in service.

It was then noticed, as the units were being coupled to the train, that something unusual was happening. Everything seemed normal with the control throttle in the IDLE position. However, as soon as the reverser was moved to either the FORWARD or REVERSE positions, the locomotive developed power and started moving with the throttle in the IDLE position.

A quick inspection revealed that the middle GP-7 unit was the one at fault. It would become jumpy and start moving as soon as the reverser was moved either to Forward or Reverse directions. It was also noted that the battery field contactor was closing as soon as the isolation switch was closed to place the engine on line.

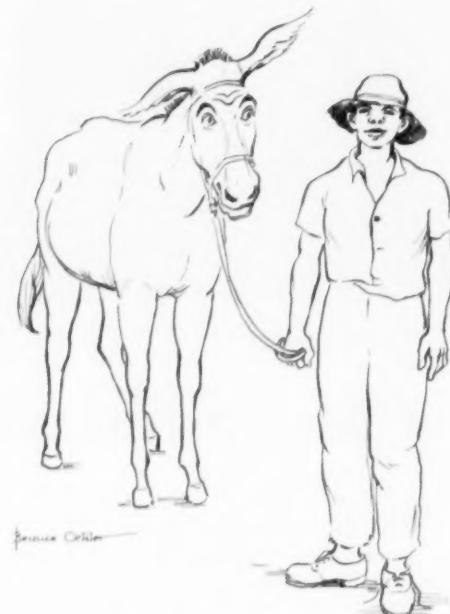
The problem for the maintainer was to find what was causing the battery field contactor to close ahead of time, causing the unit to become excited and energized. What appeared to be a simple case of trouble-shooting turned out to be rather difficult. The local electrician checked everything that he could think of that might have caused the trouble, but was unable to locate it.

The unit was moved to its home maintenance point for further attention. The diesel supervisor and maintainers then gave some thought as to what condition would cause the battery field contactor to close as soon as the isolation switch was closed.

There seemed to be but one answer. There must be a short circuit that was energizing the battery field so that the generator was excited, and ready to deliver power as soon as the series or power contactor was energized. If that theory was correct, then it would need only the closing of the reverser in either direction to cause the jeep to become jumpy.

The next question was where could be a good location

This series of articles is based on actual experiences of men who operate and maintain diesel-electric locomotives.



Ah just thought where Ah would go if Ah was a mule

for the suspected short circuit? The PC wire which constitutes the starting point in the control system seemed bound to be involved. Also, the generator field circuit was suspected.

The next question was: where is a likely location for the PC wire and GF to get together? It was decided that the cable of wires back of the control stand might provide a good hunting ground.

The electrician started prying the wires apart and found that this caused the battery field contactor to drop open. He knew that he was hot on the trail of trouble. Separating the wires revealed that the PC wire was short-circuited with wire GF-52. Retaping the wires corrected the trouble and the case of the jumpy jeep was closed.

Solving this trouble involved the same sort of planning that was followed by the negro who was sent out to find a mule that had strayed away. Asked how he located the mule so quickly, he replied: "Ah just thought about where Ah would go if Ah was a mule, and that is where Ah found him."



**One man
DOES THE WORK
OF FIVE!**

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GONDOLAS
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BALANCERS**

The Wine Railway method of applying torsion springing in combination with trunnion hinges has proved a faster, more economical and a safer way to close drop end gondolas. Because the torsion action is greatest when the load is the heaviest, there is no need for a crew of four or five men to close even the largest drop ends.

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New G-E axle-driven generators give the extra power, reliability for long, trouble-free

General Electric's new GMG-162 axle-driven motor generator has over twenty-five percent more reserve power than competitive equipment. Here's what that means:

1. Better battery record. There is enough power available to charge low batteries while the car is in operation. Therefore, fewer standby rechargings are required.
2. Should axle generators in other cars become inoperative, increased demand can be met effectively. In a recent test simulating emergency conditions, load requirements

of four modern air-conditioned passenger cars were supported by **one** GMG-162.

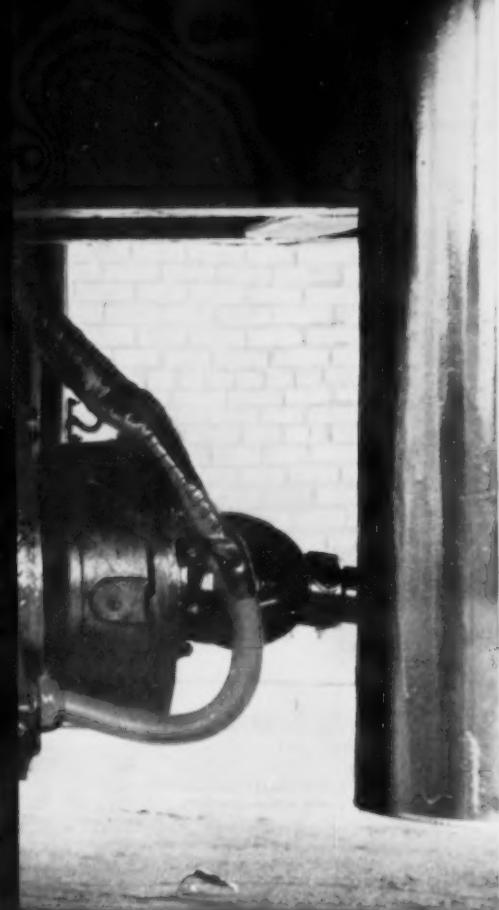
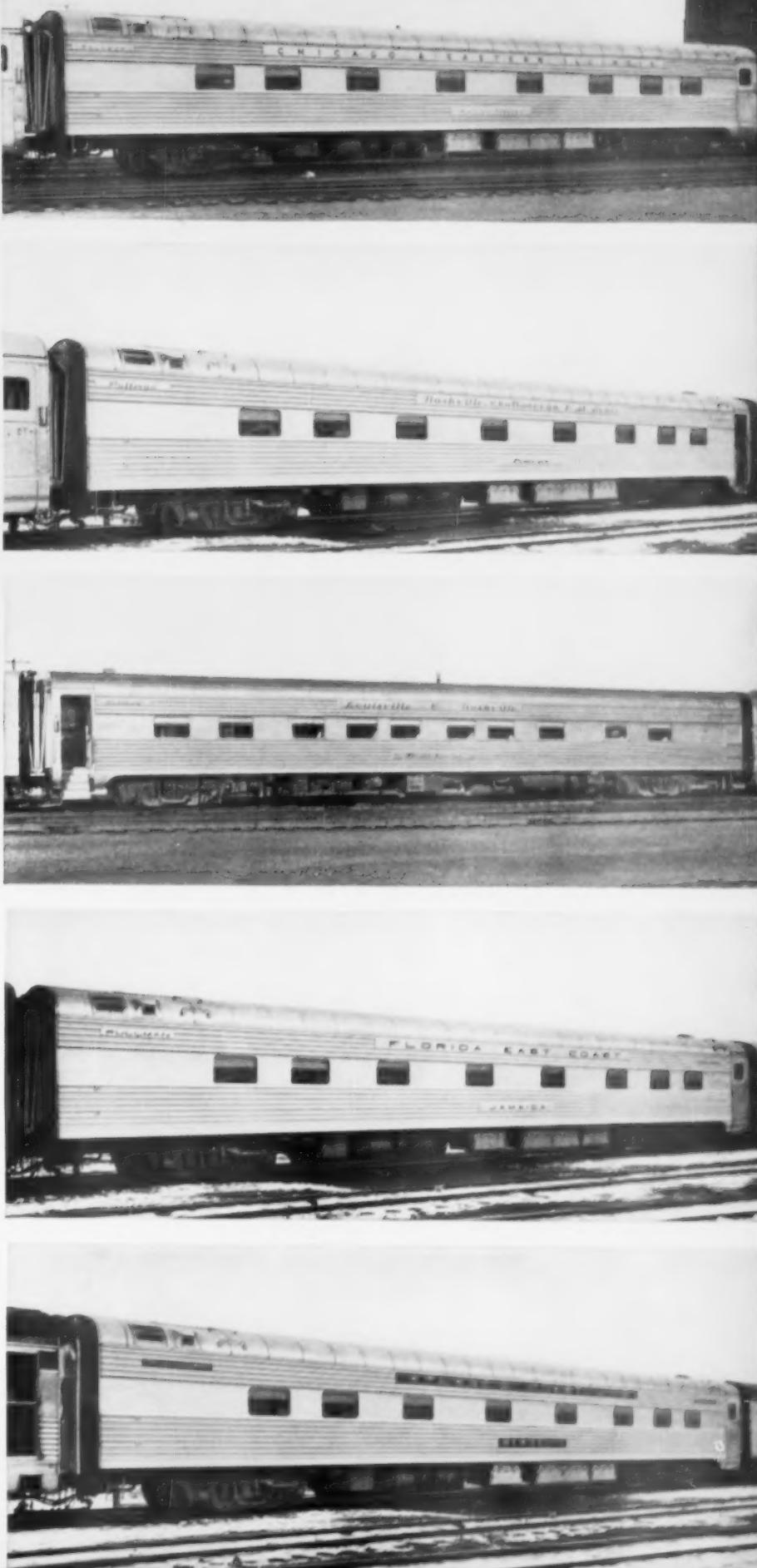
In addition, General Electric's GMG-162 has a highly simplified control system, uses only two control panels, eliminates armature reversing switch and reduces number of moving parts. It is easy to install and to maintain. For more information contact your G-E Apparatus Sales representative. General Electric Company, Locomotive and Car Equipment Department, Erie, Pa. 115-5A

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GENERAL  **ELECTRIC**

“Dixieland” operation

The first cars equipped with G.E.’s new GMG-162 were delivered to the Canadian National and Rock Island railroads in 1954. In the short time since then, orders have been received from: Atlantic Coast Line, Nashville, Chattanooga and St. Louis, Chicago and Eastern Illinois, Florida East Coast, Louisville and Nashville.



Questions and Answers

General Motors Diesel-Electric Locomotives

This is a new series of Questions and Answers pertaining to General Motors diesel-electric locomotives. The references to manual and page numbers in the text indicate where the original material may be found in the builder's technical publications or instruction manuals. These are usually available to authorized employees on each railroad.

G259-Q—How does the battery enter into the picture?

A—A 64 volt battery in the low voltage system is the source from which power is taken to start the engine.

G260-Q—What takes place once the engine is started?

A—The auxiliary generator then takes on the job of supplying power to the low voltage system.

G261-Q—What does the alternating current system include?

A—An alternating current generator (called an alternator) includes four engine cooling fan motors and four traction motor blower motors.

G262-Q—What does the alternating current system provide?

A—Provides a means of driving accessories without the use of belt drives, at speeds which vary according to the speed of the engine.

Main Generator

G263-Q—What is the nominal generator voltage?

A—600 volts.

G264-Q—Does this figure vary?

A—Yes, the voltage varies with engine speed and the condition of operation of the locomotive.

G265-Q—What field windings are contained in the main generator?

A—The main generator contains six field windings: Starting, Battery, Shunt, Differential, Compensating and Commutating.

G266-Q—When only, is the starting field used?

A—Only when the main generator is used as a starting motor to rotate the engine.

G267-Q—Which fields are the more important as regards locomotive operation?

A—The shunt and battery fields; these two fields provide the main excitation of the generator.

G268-Q—Describe the battery field.

A—The battery field is a low voltage externally excited field.

G269-Q—What functions to vary the current flowing through the battery field to initially excite the main generator?

A—The load regulator.

G270-Q—What is the purpose of this variation of battery field excitation?

A—Variation of battery field excitation controls the power output of the main generator.

G271-Q—What controls the flow of current to the battery field circuit?

A—The battery field contactor opens or closes the current to the battery field.

G272-Q—Is the main generator self-excited? If so, how is this accomplished?

A—Yes, the main generator is self-excited to the extent of the excitation produced in the shunt field.

(Manual 2310, page 303)

G273-Q—Describe the shunt field.

A—The shunt field is a high voltage field, its excitation varying with the voltage of the main generator.

G274-Q—What serves to control the circuit to the shunt field?

A—A shunt field contactor.

G275-Q—How much does this contactor operate with relation to the operation of the battery field contactor?

A—Interlocks are built into the shunt field contactor so that this contactor must close before the battery field contactor can close.

G276-Q—How are the differential, compensating and commutating fields connected and what is their purpose?

A—These fields are permanently connected, and are a matter of engineering design, providing generator characteristics and proper commutation.

Traction Motors

G277-Q—Describe the traction motors.

A—The traction motors (Model D-27) are direct current, series wound motors geared to the wheel axles.

G278-Q—How are the motors reversed?

A—By changing the direction of current flow in the field windings, the direction of current flow in the armature always being the same.

G279-Q—What functions to reverse the current flow in the traction motor field windings?

A—A reverser drum operated by electro-pneumatic control.

G280-Q—How are the traction motors cooled?

A—By alternating current driven blowers, one for each motor.

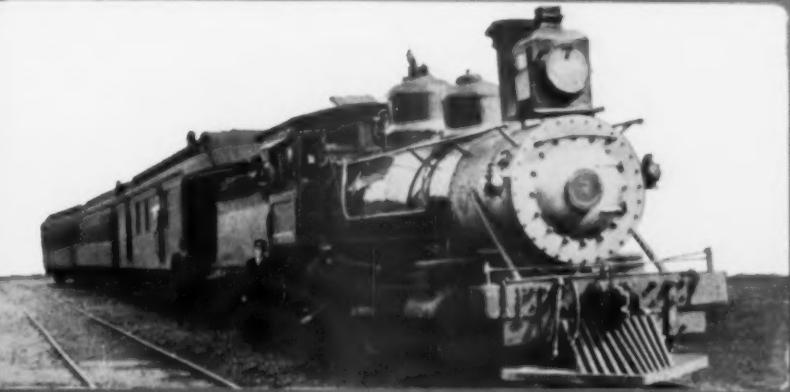
G281-Q—Where are the traction motor blowers located, and how do they operate to cool the traction motors?

A—They are mounted on the floor of the engine room and blow air through flexible ducts to the traction motors.

G282-Q—What is the speed of the traction motor blowers?

A—Their speed varies with the speed of the engine; this is due to the engine speed varying the frequency of the alternator.

(Continued on page 68)



This handsome veteran, No. 7 of the Louisville and Nashville, paused to have its picture taken sometime around the turn of the century. It produced a tractive effort of 22,700 lbs., saw service for the L & N until 1932.



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LOW CONDUCTIVITY . . . Thoroughly washed and sterilized, all-hair heat barrier. Rated conductivity .25 btu per square foot, per hour, per degree F., per inch thick.

LIGHT WEIGHT . . . Advanced processing methods reduce weight of STREAMLITE HAIRINSUL by 40%.

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MERCHANDISE MART, CHICAGO 54



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53' 6" long—50-ton capacity

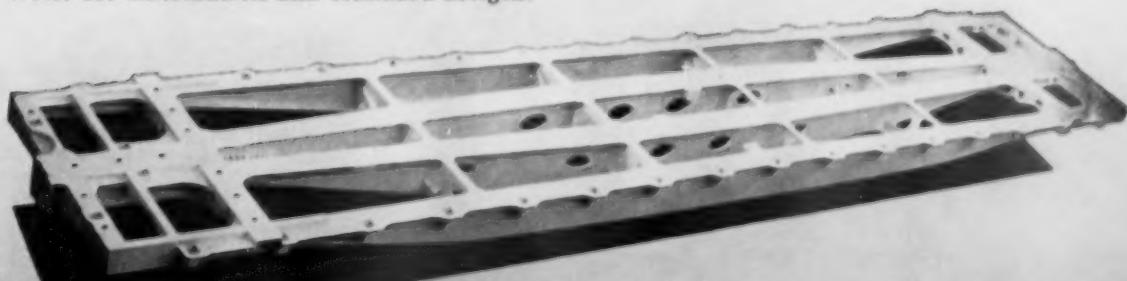
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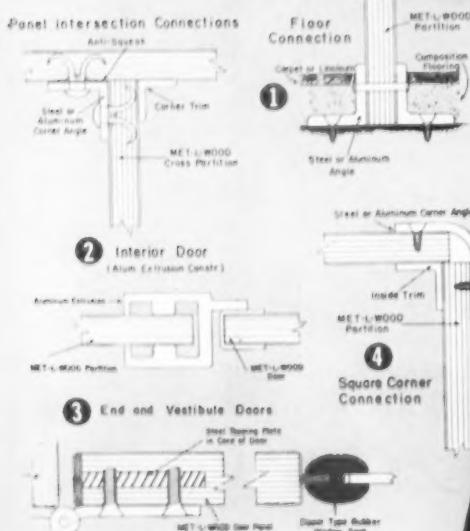
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Met-L-Wood walls provide a smooth, luxurious finish in addition to saving weight and simplifying construction.



MET-L-WOOD passenger car partitions, doors and paneling not only produce beautiful finished surfaces, but can also save up to 73%* in weight and a substantial amount of construction time. Shown at left, and described below are typical Met-L-Wood construction details. Full information on Met-L-Wood versatility in new or rebuilt cars will be furnished promptly on request. Write today.

1 Panel intersections with Met-L-Wood can be made invisible from outside with the use of split rivets. Floor connections may be made in a variety of ways, one of which is shown here, using through-rivets and metal screws.

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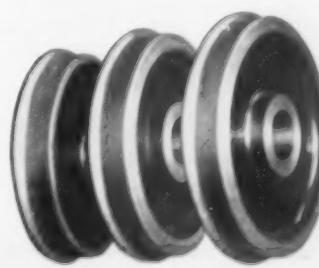
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COMPANIONS TO BETHLEHEM FORGED-STEEL AXLES

FREIGHT • PASSENGER • DIESEL



Questions and Answers

(Continued from page 62)

G283-Q—What limits the maximum permissible speed of the locomotive?

A—The maximum permissible top speed of the locomotive is limited by the safe RPM of the traction motor armature.

G284-Q—Such being the case, what provides for a high speed train operation?

A—A high speed gear ratio is required.

G285-Q—What is needed to start and use full horsepower with low speed tonnage trains, without overheating or damaging the electrical equipment?

A—A low speed gear ratio is needed for such a condition.

Reversing Locomotive

(Manual 2310, page 304)

G286-Q—What action takes place when the reverse lever is moved to forward or reverse position?

A—The respective forward (FOR) or reverse (REV) magnet valves located in the electrical cabinet are energized.

G287-Q—What takes place when either of these magnet valves is energized?

A—When either magnet valve is energized, it allows control air to pass through the valve, moving the reverser to the desired direction.

G288-Q—How are the positions indicated on the reverser drum?

A—With four long segments showing on the reverser drum, reverser is in forward; eight short segments can be seen when in reverse position.

Transition

G289-Q—What is the term transition applied to?

A—This term is applied to the changing of traction motor connections on a diesel-electric locomotive.

G290-Q—Why is it necessary to make such changes?

A—So that full power may be obtained from the main generator within range of current and voltage limits.

G291-Q—Briefly then, what is transition?

A—A method of adjusting the traction motor "back pressure" (counter e.m.f.) bucking the input of power from the main generator, so that this back pressure will not become too high at higher speeds nor too low at lower speeds.

G292-Q—With what type of transition are the present E-7 locomotive basically equipped?

A—Three relay automatic transition.

G293-Q—What relays are used with three relay transition?

A—Relays FTM, FTP and BTP are used to affect fully automatic forward and backward transition.

G294-Q—Is there any provision for operating units so equipped manually?

A—No.

G295-Q—What provision has been made for dynamic braking or use in multiple operation with older units not equipped for automatic transition?

A—Lead units are equipped with transition levers for this purpose.

Fairbanks-Morse

Diesel-Electric Locomotives

This series of Questions and Answers pertains to Fairbanks-Morse diesel-electric locomotives. The references to manual and page numbers indicate where the original material may be found in the builder's technical publications or instruction manuals. These are usually available to authorized employees on each railroad.

F239-Q—How does the oil flow at higher engine speeds?

A—A relief valve will open at 20-25 pounds, to allow part of the oil to flow through an external by-pass around the 6 element filters.

F240-Q—What takes place in the event that the oil cooler or strainer is plugged?

A—Plugging of the oil cooler or strainer will open an external by-pass in the pump and cause the engine to shut down from low oil pressure if sufficient drop occurs.

F241-Q—What is the setting of the pump relief valve?

A—Seventy pounds and it is not adjustable.

F242-Q—What affords low oil pressure protection?

A—An oil line from the lower engine lubricating oil header to the engine governor provides connection to the low oil pressure shut down feature, located in the governor.

F243-Q—How is the oil level measured?

A—Oil level is measured at the dip stick located in the engine sub-base on the left side of the engine.

F244-Q—When should the oil level be checked and what should it be?

A—The lube oil level should be checked at the start of every run, and should be between the FULL ENGINE and the ADD OIL marks.

(Bulletin 1706—117-A, page 3)

F245-Q—How should the gage be read if engine is running when oil level is checked?

A—Read the side of the gage marked ENGINE RUNNING.

F246-Q—How should the gage be read if the oil level is checked with engine stopped?

A—Read the side of the gage marked ENGINE STOPPED.

F247-Q—Describe the gaging operation.

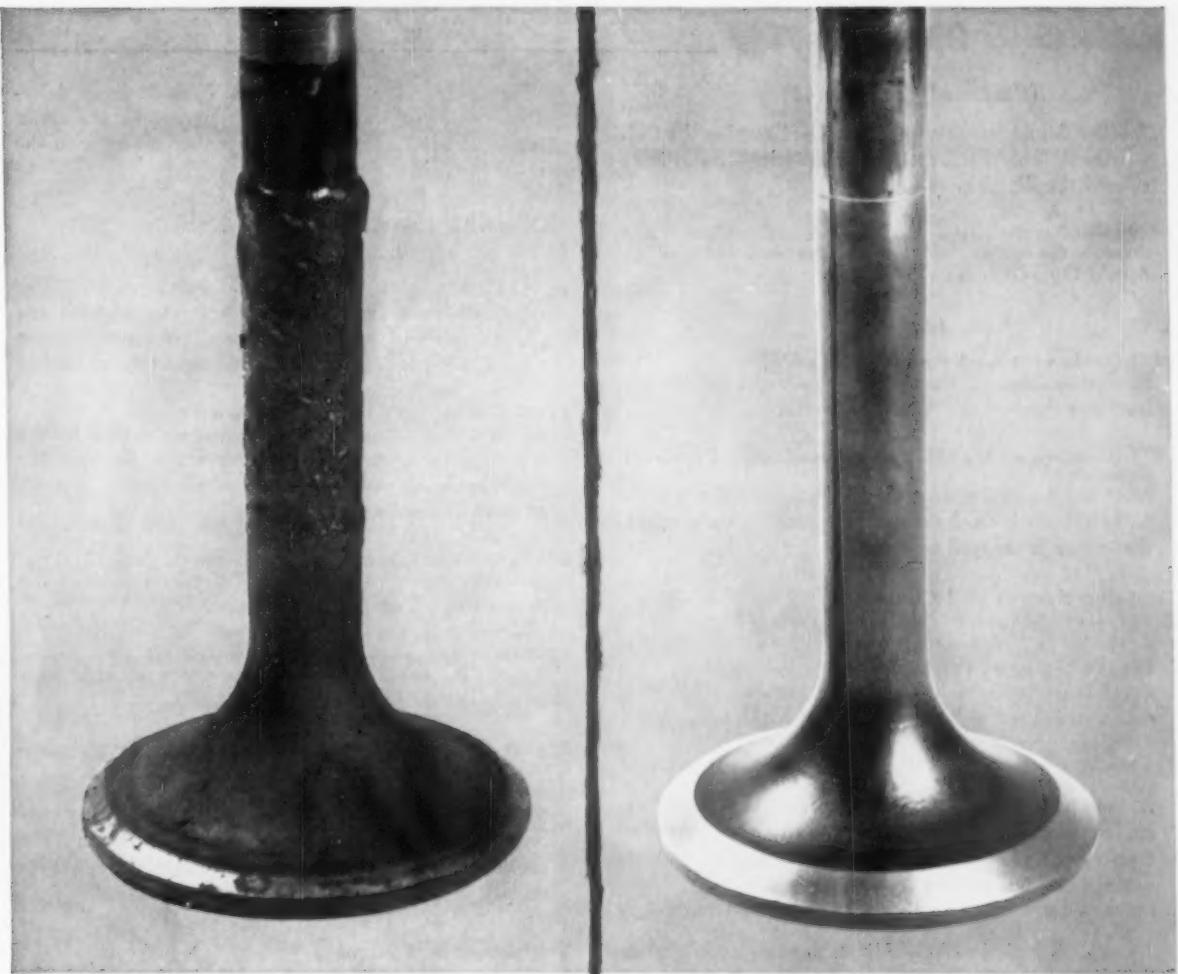
A—Unscrew bayonet gage, remove and wipe clean of oil. Insert to full thrust but do not screw onto pipe. Withdraw and read proper side. Replace in pipe and screw-down snug.

Filling System

Initial Fill

F248-Q—What should the oil level be when the system is being filled for the first time?

(Continued on page 70)



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Questions and Answers

(Continued from page 68)

A—Oil should be added until the level reaches the OIL CHANGE-NEW FILL mark on the ENGINE STOPPED side of the dipstick.

F249-Q—After the engine has been run and oil distributed through the system, what should the level be?
A—At the FULL ENGINE mark.

Adding Oil

F250-Q—At what level should oil be added?

A—Lubricating oil should not be added until the oil level has reached the ADD OIL mark.

F251-Q—When oil is added, at what mark should the level be shown?

A—Until the level reaches the FULL ENGINE or FULL SYSTEM mark on the dipstick, depending on whether the engine is stopped or running.

Draining System and Changing Oil

F252-Q—At what point is the system drained?

A—From the bottom of the engine crankcase through the drain pipe at the pump end of the engine. The drain is equipped with a valve at pipe plug at the end, and is located just ahead of the rear truck.

F253-Q—Describe the initial operation for changing lubricating oil.

A—(1) Open drain valves at oil filter and cooler in engine room. Filter and cooler will drain into the crankcase. (2) Remove pipe plug in end of system drain pipe on outside of locomotive. (3) Open crankcase drain valve on outside of locomotive.

(*Bulletin 1706—117-A, page 4*)

F254-Q—What should follow?

A—When oil flow stops, close crankcase and filter and cooler drain valves and replace pipe plug in the end of drain pipe. Renew filter elements and clean strainer.

F255-Q—Describe the operation for re-filling.

A—(1) Refill system to OIL CHANGE-NEW FILL mark on the ENGINE STOPPED side of the dipstick. (2) Start engine and allow oil to circulate and fill system.

F256-Q—What should be done next?

A—Stop engine, allow oil to settle in crankcase and take level reading on bayonet gauge. Level should be at the FULL ENGINE mark on ENGINE STOPPED side of dipstick. If necessary add enough oil to bring the level up to FILL ENGINE mark.

F257-Q—How is the 6 element oil filter serviced?

A—A drain valve is provided to drain the filter into the crankcase. A plugged opening is also provided at the rear of the filter, draining into a waste hose. Drain Valve is located by the filter.

Low Lubricating Oil Pressure

F258-Q—Give some causes for low lubricating oil pressures.
A—Some causes are dirty strainer, insufficient oil, oil

diluted by fuel oil or water, line broken, pump defective, cooling water above 195 degrees F. and filter or cooler drain pipe open, by-passing oil back to the crankcase.

GENERAL DESCRIPTION

(*Bulletin 1706—118-a, page 1*)

F259-Q—Describe the cooling water system.

A—A single cooling water system is utilized with one engine driven centrifugal pump circulating water through the engine, radiators and lubricating oil cooler.

F260-Q—How does the water circulate?

A—Water is drawn from the engine water tank by the engine driven pump, circulating water through the engine cooling passages to two parallel banks of radiators in the cooling hatch.

F261-Q—What happens after the water is cooled?

A—After being cooled, the water passes through the lubricating oil cooler to the engine.

F262-Q—What serves to cool the radiators?

A—Air for cooling the radiators enters through shutters on the sides of the locomotive unit.

F263-Q—What mechanical medium provides for air circulation?

A—The air is drawn through the radiators and expelled through openings in the roof by four alternating current motor driven fans mounted at the top of the cooling hatch. (Three fans are installed in 1,600 hp units.)

Temperature Control

F264-Q—How are the fan motors connected?

A—The fan motors are electrically connected to the alternators by contactors located in the lower cabinets near the left engine room side doors.

F265-Q—What operates the fan contactors?

A—The fan contactors are energized by electric contacts in a pneumatic step controller located in the upper cabinet by the left engine room side door.

F266-Q—What is the purpose of the additional contact on the step controller?

A—An additional contact operates the shutter magnet valve.

F267-Q—What is the function of the magnet valve?

A—The shutter magnet valve controls air at main reservoir pressure to the two shutter operating cylinders.

F268-Q—What operates the pneumatic step controller?

A—The pneumatic step controller is operated by a 0-17-lb range in temperature control air pressure, regulated by a thermostat located in the water inlet line to the oil cooler.

F269-Q—What does the air pressure accomplish?

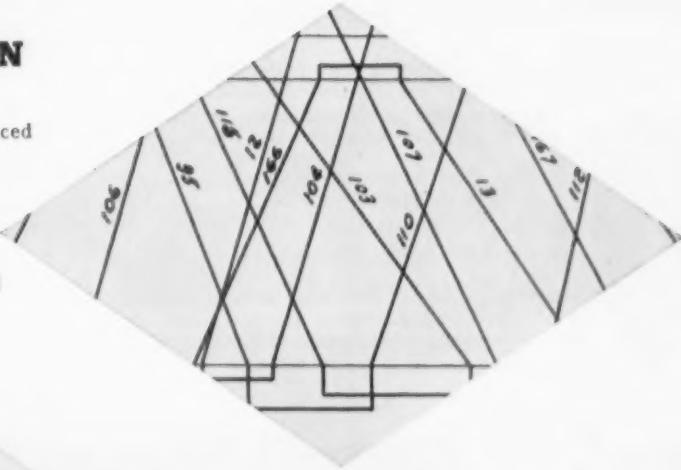
A—This air pressure rotates a camshaft to make the electric contacts close in sequence.

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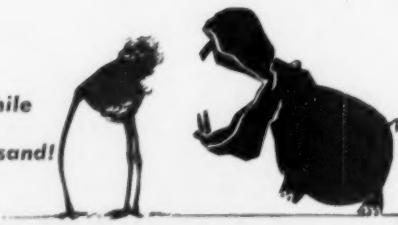
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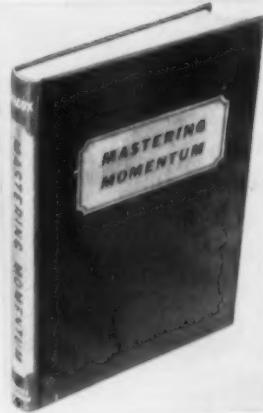
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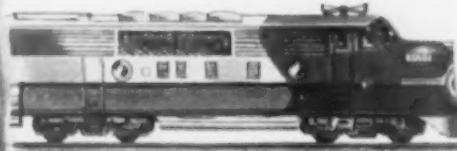
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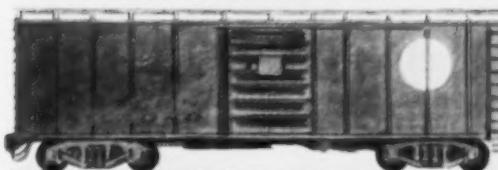
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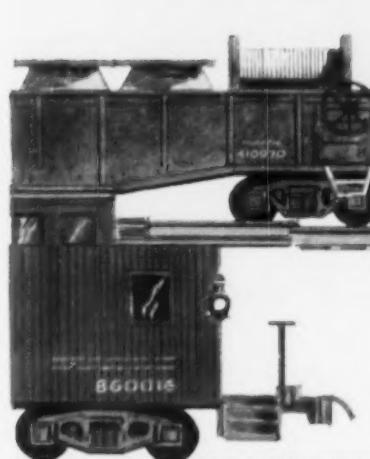


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Questions and Answers

Interchange Rules

This is the seventeenth installment of a series of questions and answers on the Association of American Railroads Code of Rules Governing the Condition of, and Repairs to, Freight and Passenger Cars for the Interchange of Traffic which may help car men clarify their understanding of the philosophy, intent and requirements of the Interchange Rules. The answers given to the questions are not to be considered interpretations of the rules of Interchange, which can only be rendered by the Arbitration Committee acting officially. The comments, however, come from a background of intimate association with the application of the rules. Obviously, comments or opinions as of today, may be inapplicable after a revision of the rules or further interpretations by the Arbitration Committee.

180-Q—Where certain types of A.A.R. No. 18 Brake Beams are designed so that it is possible to readily remove the heads, would it be proper to render charge versus car owner where repairing line elected to make separate renewal of head at car in such cases?

A—Such work would be considered as temporary repairs, no bill. See Interpretation No. 11 to Rule 107.

181-Q—What is the proper method of charging for Universal UX-5 truck spring plate?

A—Inasmuch as the patent rights on Universal UX-5 truck spring plate expired on June 6, 1950, charge for same should be computed on weight basis at price per pound specified in Item 188 of Rule 101.

182-Q—In forwarding badly damaged car to home road for repairs loaded on another car, is the handling line required to conduct a special investigation to determine the owner of the car in question?

A—The car owner is considered as that represented by the reporting marks on the car. Rule 112 was not intended to require investigation beyond the reporting marks to establish an owner which might be different from that indicated by initials or name stenciled on car.

183-Q—What is the proper labor charge for renewal of Barber Stabilizer Friction Castings?

A—Labor charge for application of Barber Stabilizer Friction Castings to Barber Stabilized Freight Car Truck should be on the basis of Item 156 of Rule 107.

184-Q—Would it be advisable to incorporate provisions in the Interchange Rules to provide handling line responsibility for tar applied to cracks between floor boards of box cars?

A—It would be very difficult to establish a rule of this nature which would work out equitably for all concerned. Such a rule would place a very difficult burden on interchange inspectors as it would be necessary to open the doors on all empty house cars to determine whether or not this condition existed. Furthermore, this condition could not be detected in interchange on loaded house cars with the result that in some cases the road which unloaded the car and forwarded same empty, might be subsequently carded at the next interchange point, even though entirely innocent with respect to this condition.

185-Q—Would it be advisable to establish definite periods for reweighing empty tank cars similar to the provisions now applicable to other types of freight cars?

A—Effective January 1, 1916, a requirement was placed in the Interchange Rules providing that tank cars should be weighed and stenciled to show their lightweights, this work to be performed by the tank car companies only, or by their authorized representatives. This regulation was made effective on recommendation of the Operating-Transportation Division of the A.A.R. as they needed these lightweights for the information of train crews in making up train tonnage.

Tank cars are used for the transportation of a great variety of products, practically all of which are in liquid form. Tank car companies have gone to a great amount of expense to accurately determine the gallonage capacity of the tank of every car. These capacities are published in the United States, Canadian and Mexican Railroads Freight Tariff No. 300-G issued by W. J. Prueter, Agent, 516 West Jackson Boulevard, Chicago, Illinois. Capacities are also published by the tank car owners in units of gallons in outage tables. Whenever the weight of the commodity is required, such weight is obtained by converting to pounds from accurate measurements of gallons.

There are some products which adhere to the inside of the tanks and after a car has been unloaded there is a variance in the so-called lightweight when car is empty.

The complete cleaning of the inside of tanks is not only hazardous but is an expensive operation. This cleaning would be necessary every time cars were lightweighed if re-lightweighing was a requirement at regularly specified intervals.

The American Petroleum Institute's Code Committee on Tank Car Quantities eliminated weighing of cars in their Code as an alternative procedure because "the accuracy tolerance in weighing is variable and not sufficiently good for inclusion in a code."

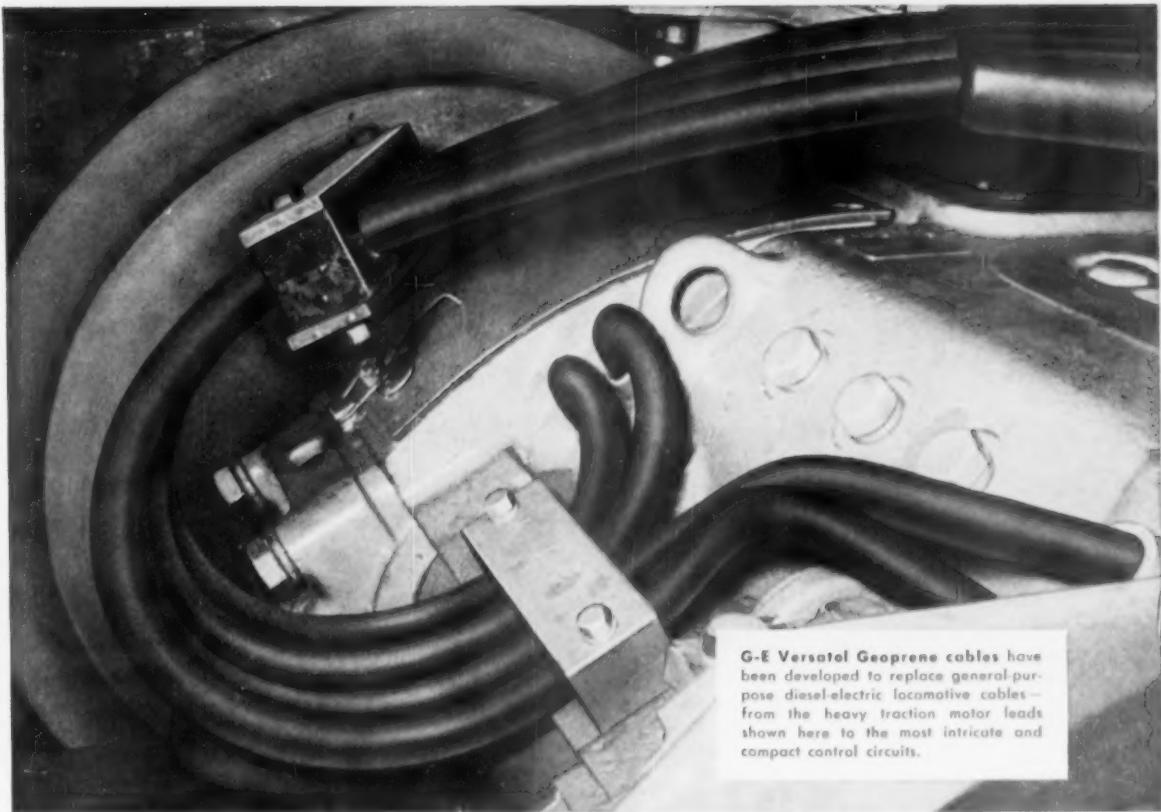
Furthermore, most commodities shipped in tank cars are sold on a gallonage basis and the weight of the commodity can be readily obtained by multiplying the number of gallons contained in the tank by the weight per gallon.

186-Q—Do the requirements of Paragraph (f-2) of Interchange Rule 3 apply to depressed, well-type or "piggy-back" types of flat cars?

A—The requirements of Paragraph (f-2) of Interchange Rule 3 do not apply to depressed, well-type or "piggy-back" types of flat cars, or any other flat cars of special design. Cars in these categories are considered as being of special design, most being equipped with anchorage details which meet the requirements for special loads used on this type of equipment.

187-Q—Where a pair of wheels is removed account slid flat and journal length on 5 by 9 journal is found to be 9 $\frac{1}{8}$ in., which renders the axle as scrap, who is responsible for renewal of such axle?

A—The party responsible for change of wheels account slide flat is also responsible for the renewal of the axle having journal length of 9 $\frac{1}{8}$ in. in such cases.



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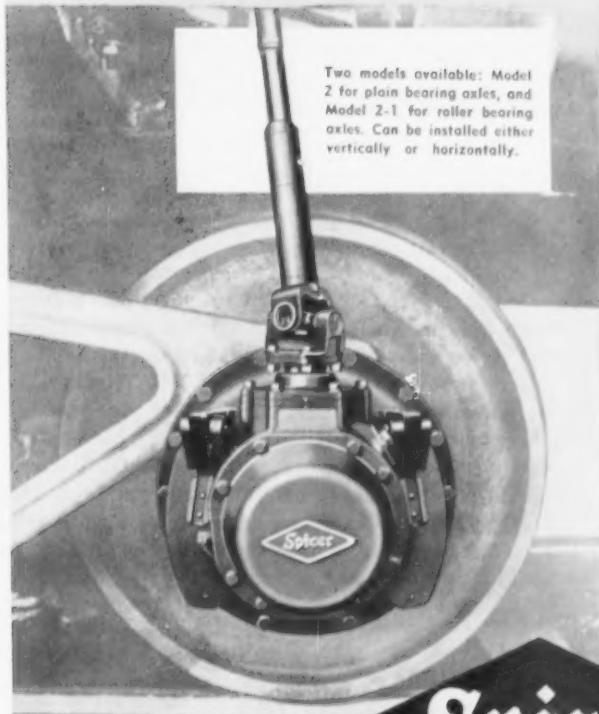
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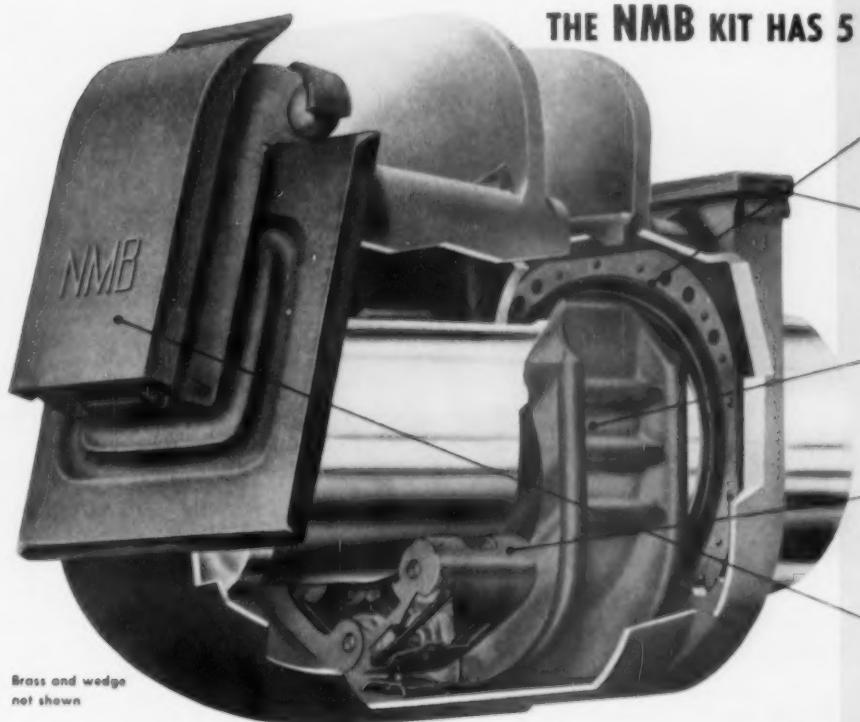
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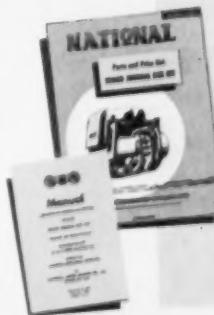
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New York 17, N. Y.; Room 537, 527 Lexington Ave. Plaza 3-6647
Chicago 3, Illinois; Room 4113 Field Bldg., 135 S. LaSalle St. Franklin 2-2847
Redwood City, California; Broadway at National Ave. Emerson 6-3861



NMB has manufactured tens of thousands of oil seals for roller bearing cars and over 1,000,000,000 oil seals for AUTOMOBILES • TRUCKS • TRACTORS • AIRCRAFT • MACHINES • HOUSEHOLD APPLIANCES

*Based on operating experience of major Class I railroads.



GARLOCK REPLACEMENT PARTS

Gaskets—Packings—Molded Rubber Rings for diesel locomotives...



Section of Garlock's diesel parts stock room

**NOW pre-stocked in handy packages,
ready for immediate shipment**



Packaging and labeling
diesel parts after
inspection.

GARLOCK diesel replacement parts—gaskets, packings and molded rubber rings—are packaged in convenient quantities for ease in handling, storing and redistribution to shop men, overhaul shops and terminal points.

All packages are labeled for instant identification—no cross-reference parts list needed.

Garlock diesel gaskets, packings and molded rubber rings are giving completely satisfactory service on leading railroads. Specify Garlock diesel replacement parts and write us for complete parts-and-price list.

THE GARLOCK PACKING COMPANY, PALMYRA, NEW YORK
In Canada: The Garlock Packing Company of Canada Ltd., Toronto, Ont.

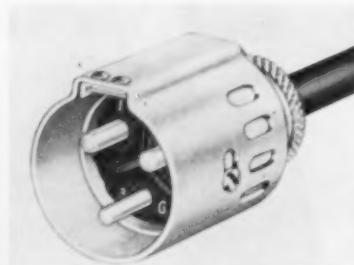
Branch Offices in Most Principal Cities



GARLOCK
PACKINGS, GASKETS, OIL SEALS,
MECHANICAL SEALS, RUBBER EXPANSION JOINTS

NEW DEVICES

(Continued from page 11)



Plug and Receptacle

The Midget Triploc plugs and receptacles for portable and detachable electrical devices are assembled with individually renewable parts. The interchangeable and reversible contact units have round prongs which are claimed to give positive contact with good mechanical strength. The contact units also have raised insulated arc barriers for increased creepage distance between poles and to ground. The plugs are self-locking and need only a slight twist to release them. Contacts are protected by an extended housing shell. Ratings are 15 amp at 125 volts, and 10 amp at 250 volts. *Pyle National Company, 1340 N. Kostner avenue, Chicago 31.*

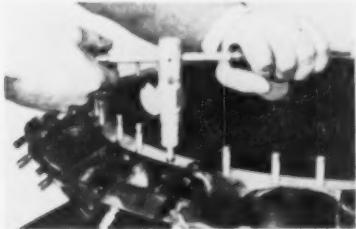


Engine-Driven Welder

This 200-amp engine-driven welder has been designated the Type WD20AG. It is rated for current range of 40 to 250 amp and will handle all d-c or a-c/d-c electrodes from $\frac{1}{16}$ -in. to $\frac{1}{4}$ -in. The unit is powered with a liquid-cooled Hercules engine with a fuel tank capacity for 13 hours of full-load operation. The engine has a cartridge-type oil filter and an oil-bath air cleaner. The gear-driven governor is said to give close control and rapid response.

The welding generator is driven through a flexible metal-disc coupling. Its laminated frame has dove-tail mounted poles and precision wound coils. Brushholders are fixed at the proper setting and brushes are

held by constant force springs. Generator control consists of a tap switch and current rheostat. There are six electrode taps. All operating parts are protected by a full length sheet steel canopy. *General Electric Company, Schenectady 5, N. Y.*



Stud Driver

Three important stud operations are performed by this collet-type tool, the Service "Bi-Way" Studder. It extracts studs without damaged and warped threads, and permits their reuse. For production stud driving, the tool features automatic gripping action, instant shifting to pulling action, and fully adjustable control over the driving depth so that uniform exposed stud lengths can be produced. For the removal of broken or stripped studs, a serrated collet is available that will extract studs with as little as $\frac{1}{32}$ -in. exposed length.

Five models cover the range of stud sizes from $\frac{3}{16}$ -in. to $\frac{3}{4}$ -in. for all styles of thread. The driver can be adapted to hand or power drive and a special long narrow nose model is available. *E. V. Nielsen, Inc., 128 Broad street, Stamford, Conn.*



Geared-Head Wrench

The X-4 geared-head wrench is a small, compact unit that serves as a multiplier between ratchets or torque wrenches, and sockets or other attachments. Heavy assembly or disassembly operations requiring a rotary effort of over 200 ft-lb can be done without dangerous snap or jarring action. The unit is lightweight, portable, and can be used in close quarters. It has a four-to-one ratio, and, when used with a torque wrench, simplifies the tightening of threaded parts to a specific torque.

The X-4 has a drop-forged, heat-treated, chrome-moly steel head. All highly stressed

Keep Costs Low... Efficiency High

with
**MAGNUS
CLEANING
METHODS**

In railroad operations where modernization has been adopted, Magnus Cleaning Methods have amply proved their superiority in every phase of cleaning.

On Diesel Cleaning . . .

Magnus Decarbonizing Cleaner in Magnus Aja-Dip Cleaning Machines will reduce hand labor on cleaning diesel parts by close to 85% . . . will cut the time required in half . . . and will save more than half of the cleaner costs. Magnus Diesel Magnusol for cleaning the exteriors of road engines will cut manpower and time in half . . . and will do a much better cleaning job. In diesel cabs, Magnus 5-RR will insure faster cleaning at greatly reduced cost.

On Other Cleaning Operations . . .

Magnus Cleaners and/or Machines offer you similar opportunities to cut costs and improve results . . . from cleaning A-frames or blocks, trucks and underbodies, engine pits, oily concrete areas, signal and communications equipment, to the routine jobs of cleaning linoleum and tile in washrooms, offices or stations, coach interiors, head liners, etc.

CHECK YOUR CURRENT PRACTICE AGAINST
MAGNUS METHODS. ASK FOR THE
MAGNUS RAILROAD CLEANING MANUAL.



Railroad Division
MAGNUS CHEMICAL CO., INC.
77 South Ave., Garwood, N. J.

Please send us a copy of the Magnus Railroad Cleaning Manual.

NAME _____ TITLE _____

RAILROAD _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____



parts, including the detachable anchor bar, are made of special heat-treated alloy steels. Head and shafts are sealed and lubricated for life. Drive is through planetary gears. *Bonney Forge & Tool Works, Allentown, Pa.*

generator are supported on a welded I-beam base and are delivered as a package ready to install. Charging cables for each circuit are supplied. The front of the control cabinet is hinged for easy inspection. *The Hertner Electric Company, 12690 Elmwood ave., Cleveland 11, Ohio.*

Battery Charger

Lead-acid or nickel-alkaline batteries on six industrial trucks can be charged at the same time with the HX6 Charg-O-Matic battery charger. This six-circuit model is intended for central service charging stations. The manufacturer claims that operation is simple and that there is no danger of overcharging. The control cabinet and motor



consumption because the water temperature is raised to 100 deg before it enters the main heating circuit.

The piston feed pump runs in oil and has stainless-steel ball-check valves to provide high volume output and dependable operation. No clay or firebrick are used in the cabinet and all the controls are installed on the front. A special control automatically maintains a uniform acid or alkaline content in the cleaning solution. *Kelite Products, Inc., 1250 North Main street, Los Angeles 12.*

Welding industry's greatest cost-cutting twins . . .



IDEALARC and JETWELD

Never before has any combination of welder and electrode offered such a cost-saving potential in faster, easier welding. Here's why:

Idealarc for easy, efficient operation . . . best welder to give you both AC AND DC WELDING CURRENT with Dual Arc Control where you select "soft arc" or "forceful arc" on AC, as well as DC and in addition . . . hot starting on DC as well as AC.

Jetweld for high-speed operation . . . first universally adopted iron-powder electrode for extra-fast welding high deposition drag operation
LET LINCOLN DEMONSTRATE HOW YOU CAN PROFIT . . . NOW. Send for Bulletin 1343. Write . . .

THE LINCOLN ELECTRIC COMPANY

Dept. 1704 • Cleveland 17, Ohio

The World's Largest Manufacturer of Arc Welding Equipment

Paint Brush Conditioner

A vapor solvent and an air-tight container combine to condition paint brushes so that the bristles are soft and ready for use. The industrial-style container with an overall height of 15-in. holds eight 6-in. brushes or 12 to 14 smaller ones. The brushes are suspended in the air-tight space surrounded by the solvent vapor which evaporates from a wick and liner. The solvent, used on both nylon and natural-bristle brushes, is claimed to dissolve the binding oils and resins in paint, varnish, enamel, lacquer and shellac. The manufacturer claims this treatment to be more effective than soaking. *Wisconsin Laboratories, Inc., Dousman, Wis.*

Protective Coating

Railroad Cocoon is a sprayable protective coating developed especially for the railroad industry to upgrade box and hopper cars for handling Grade A commodities. It not only prepares cars for merchandise service, but can make them suitable for the bulk handling of grain, powdered coal and china clay. It is a tough vinyl plastic which is still flexible at temperatures down to 50 deg below zero and it is also satisfactory up to 180 deg above zero.

The strength and flexibility of this product are such that a coating will not tear or

**EASY TO HANDLE
IN
CRAMPED
SPOTS...**

**The
U. S. ROYAL Gold Fluted
Welding Cable**

**NEW!
HIGH IN VISIBILITY,
FLEXIBILITY,
TOUGHNESS;
COOL GRIP!**



The U. S. Royal Gold Fluted Welding Cable is so lightweight, so flexible even at low temperatures that it makes welding in cramped locations a simple matter. U. S. Royal coils easily, doesn't kink or tangle. It cuts down "drag" and operator fatigue.

U. S. Royal Gold is easier to see! Its bright yellow color is visible in the grit and grime of the shop floor. Workmen don't trip over it, or get it entangled with equipment. Also, the yellow jacket provides an excellent contrasting color to black for conductor identification where two cables are required for welding machines.

The greater flexibility of U. S. Royal Gold also pays off in greater dependability at terminal connections. Lower maintenance costs than with any other welding cable.

COOLER TO HANDLE! The unusual *fluted* jacket provides greater surface area and thereby dissipates heat faster.

SUPERIOR IMPACT RESISTANCE! Proved by tests to be greater than that of conventional constructions.

The special 60% natural rubber insulation and the 60% natural rubber jacket give U. S. Royal Gold an unsurpassed resistance to moisture. *Made only by United States Rubber Company.* Available at your electrical supply house.

Write address below for free folder that gives facts demonstrating the superiority of U. S. Royal Gold Fluted Welding Cable.

UNITED STATES RUBBER COMPANY
Electrical Wire and Cable Department • Rockefeller Center, New York 20, N. Y.

Manufacturers' Literature

Following is a compilation of free literature, pamphlets and data sheets offered by manufacturers to the railroad industry. Circle the number(s) on coupon below to receive desired information; requests will be handled direct by manufacturers.

- 1. BATTERIES.** *C & D Batteries, Inc.* 3 bulletins describe, illustrate and give specifications on batteries for control, switchgear, emergency lighting and auxiliary power (Bulletin CP-538 "Hi-Power Batteries"; Bulletin CP-536 "Plastical Lead-Calcium Batteries"; Bulletin CP-537 "Plasticell High-Tensile Alloy Grid Batteries"). Write-in bulletin number.
- 2. DIESEL RAILCARS.** *Maschinenfabrik Augsburg-Nürnberg A.G.* 12-page colorful booklet describes diesel-mechanical, diesel-hydraulic and diesel-electric railcars, 2, 3 and 4-coach units; with floor plans.
- 3. RAILROAD EQUIPMENT.** *Maschinenfabrik Augsburg-Nürnberg A.G.* Brochure "M.A.N. For Railroad Traffic" depicts railroad equipment, diesel engines, steel buildings, turntables and bridges as produced by the M.A.N. works at Nürnberg, Augsburg, Gustavsburg (Germany).
- 4. CRANES.** *Star Machine & Tool Co.* Data available on the versatile and low-cost Star Hydro-Lift Cranes in $\frac{1}{2}$ ton, 1 ton and 2 ton capacities, and in hand-operated, electrically operated, and combination manual-electrically operated models.
- 5. STAINLESS FASTENERS.** *All-metal Screw Products Co.* 8-page brochure (P-126A) lists and illustrates stainless fasteners, includes style and size data about stainless screws, bolts, nuts, washers, rivets, and "AN" fasteners.
- 6. CLEAN FLOORS.** *Multi-Clean Products.* 8-page folder (500) "Here's Everything You Need For Better Floor Care" shows the complete Multi-Clean line; describes and illustrates floor and scrubbing machines, industrial vacuum cleaners, sanding machines, floor cleaners and sealers.
- 7. PULLEYS.** *Equipment Engineering Co.* 8-page brochure describes and lists advantages of Hi-Lo automatic variable speed pulleys and Hi-Lo systems; includes graphs, diagrams, cutaway views and in-action photos.
- 8. AIR TOOLS.** *Ingersoll-Rand.* 52-page 3-color catalog "Impactools" (5200-A) describes, illustrates and gives specifications for the complete line of Air Impactools; includes on-the-job application photos and case history studies.
- 9. SOLDERLESS WIRING DEVICES.** *Aircraft Marine Products.* 28-page multi-color booklet (120054) "The Measure of a Company" deals with the growth of the solderless wiring industry
- and A-MI's development of techniques and tooling to meet specific requirements.
- 10. PISTON RINGS.** *Precision Piston Rings.* 8-page brochure gives technical data and complete descriptions of the physical properties of the eight alloys used in Precision Un-Breakable Wrought Alloy Piston and Sealing Rings.
- 11. PLUGS & RECEPTACLES.** *Joy Mfg. Co.* 12-page 2-color bulletin (B59) "Joy Electrical Connectors for Industry" illustrates and describes with pertinent details electrical plugs and receptacles for standard and special industrial needs.
- 12. GLOBE VALVE.** *Lunkenheimer Co.* 4-page circular (602) describes, illustrates and gives dimensions on LQ600 bronze globe valve with Brinellloy seats and discs.
- 13. PHOSPHATING.** *Turco Products, Inc.* 4-page pamphlet "A Better Bond For Organic Finishes" describes the complete Turcoat line of phosphating compounds; includes Phosphating Reference Chart outlining purpose of each Turcoat material.
- 14. PATTERNED METAL.** *Rigidized Metals Corp.* Pocket-sized folder "Rigidized Digest" is a quick-reading story of stainless Rigid-Tex metal in 3 parts: cost advantages, end use advantages, extra dividends; shows typical use by Missouri-Pacific for LCL tote box.
- 15. CENTRIFUGAL PUMPS.** *LaLabour Co.* 12-page 2-color bulletin (G-1) "LaLabour Packingless Self-Priming Centrifugal Pumps" describes and illustrates the pump; includes cross-section diagram showing parts, installation instructions and operating data.
- 16. REFRIGERATING UNITS.** *Carbofrozer Co.* 4-page 2-color folder lists advantages of the Carbofrozer refrigerating unit, specifications, cross sectional diagram, and presents a letter testimonial by a leading railroad on its effectiveness in use.
- 17. CUTTING TORCH.** *Arcair Co.* 12-page pocket-size booklet "Case Histories on the Use of The Arcair Torch" shows many detailed on-the-job reports on use of Arcair cutting and gouging torch.
- 18. SAFETY SIGNS & TAGS.** *Ready Made Sign Co.* 48-page 5-color catalog "Ready Made Signs for Safety" describes and illustrates in actual color over 2,200 of its stock metal signs and safety tags which aid in preventing accidents in factories, shops, and business establishments.

break down under the movement of the car. Excellent adhesion to wood, steel and aluminum is claimed; the film can not be stripped from a surface after application. Railroad Cocoon is a system of various vinyl resins and low-temperature plasticizers. It is colored white with titanium dioxide pigment to emphasize cleanliness and enable the sprayer to see the areas he has covered. The pigment chosen for the coating, which is supplied in five and 50-gal. containers, is one that will not react with the commodities shipped. It is manufactured by R. M. Hollingshead Corporation and is distributed by Brandon Equipment Company, 332 S. Michigan Avenue, Chicago.



Circuit Breaker

This two-pole common-trip circuit breaker, Type TQL, is for use in panel boards and load centers. It was designed to give protection for equipment and personnel wherever two-pole common-trip breakers are required and, according to the manufacturer, should meet all construction code requirements. Excessive current in either pole of the breaker opens both poles at the same time because of the interlocking trip mechanism.

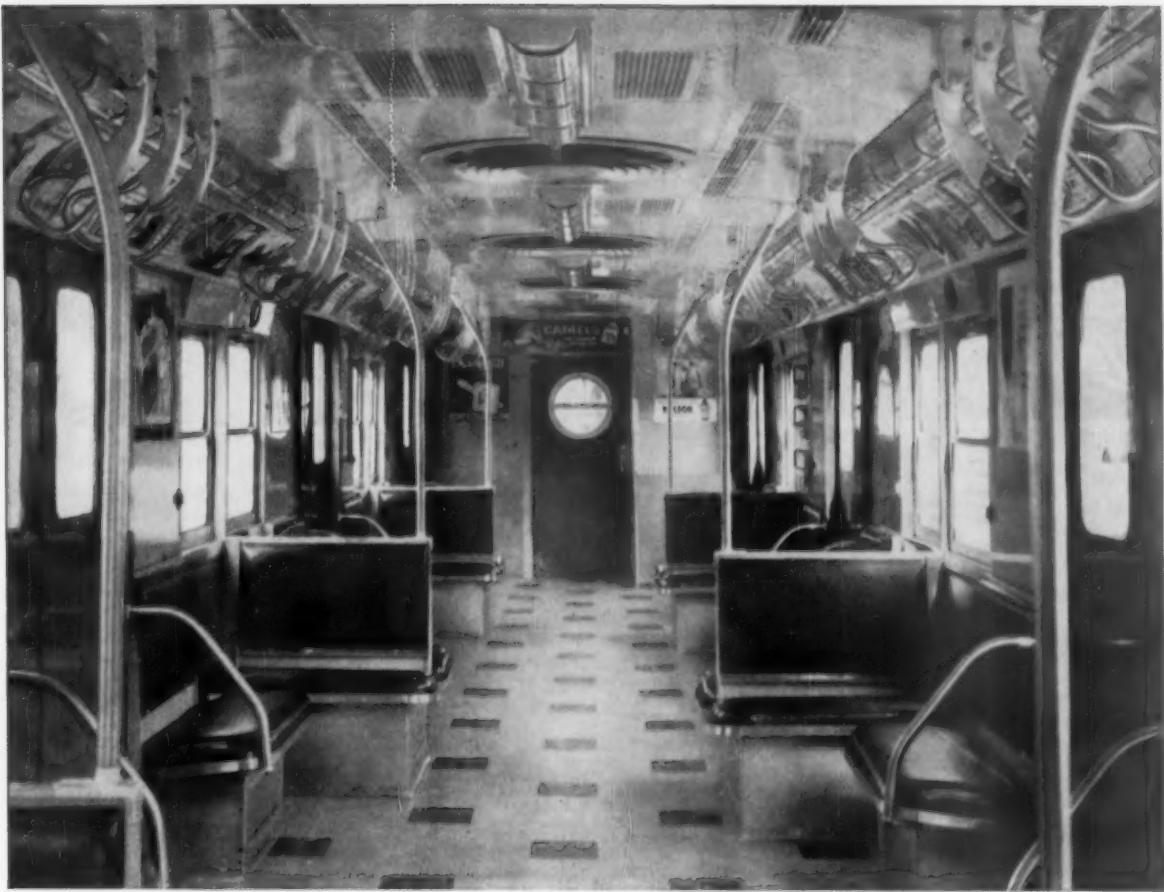
Thermal and independent magnetic trip elements provide protection against both short circuits and sustained overloads. Momentary overloads, such as motor starting, will not trip the breaker. The breaker will trip even if the handle is held in against a circuit fault.

Installation is simplified because of the plug-in construction and the straight-in wiring to terminal connections. This is a 2-in. breaker and will fit panel boards designed for 1-in. models. The TQL is available in six ratings from 10 to 50 amps for 120/240 volt a-c operation. General Electric Company, Plainville, Conn.

Reader Service Department Railway Locomotives and Cars 30 Church St., New York 7, N. Y.		JULY, 1955	
Please send literature circled below:			
1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16
17	18		
Also, please send me additional product information as follows: (company, product & page number)			
Name _____			
Company _____			
Address _____			
City _____			
Zone _____		State _____	

Synthetic Cutting Fluid

Dromus Oil E, a synthetic compound, is mixed with water to make a cutting solution for use in all type of machine tools. It does not have the petroleum base of



These New Cars, fabricated largely of nickel alloy steels, accelerate at twice the rate of the old, and provide 50% greater deceleration. Controls and safety devices are powered by

a 24-cell Edison "B4H" nickel-iron-alkaline storage battery. ACF Industries, Inc., New York 8, N. Y., built this modern type car for New York City Transit Authority.

4,766,019 passengers daily ...so New York City Transit Authority turns to Nickel Alloys

TAKING CARE of such a tremendous traffic load, naturally, puts a strain on equipment. Each car must be built for maximum safety, and for annual wear and tear from hundreds of thousands of passengers, and innumerable starts and stops.

New York City Transit Authority's answer is a new type of car that makes wide use of nickel alloys. Alloys that cut maintenance. And power costs, too, in a car that's lighter and brighter than the city has ever before seen.

The builder, ACF Industries, Inc., used truck frames and bolsters of 2½% nickel steel. High strength, low alloy steels containing nickel are utilized for car and underframing. During years of use, this type of wrought nickel steel keeps much

of its original strength. Because it's five times as corrosion-resistant as carbon steel.

Each car also uses some 2500 pounds of rigidized stainless steel, Type 302. In underseat paneling and beneath windows, this chromium-nickel alloy adds strength, cuts weight, resists scuffing, and needs no paint. Seat frames, backing, hand poles and hand straps are likewise, Type 302, a labor-saving chromium-nickel stainless steel.

Alloys containing nickel cut bulk and dead-weight, minimize wear and corrosion, add beauty and safety. So let us help you with our wide experience. Write for List A of available publications. It includes a simple form that makes it easy for you to outline your problem.



THE INTERNATIONAL NICKEL COMPANY, INC. 67 Wall Street
New York 5, N.Y.

Lewis Sealite car bolts

More than 85% of America's Class I railroads use Lewis Sealite products. Designed to do a better job . . . to last longer . . . to meet the most exacting specifications. Specify Hot Dip Galvanized, Zinc finish for Double-Life and economy. All products are manufactured in the U.S.A. to A.S.T.M. specifications.

Lewis BOLT & NUT COMPANY
504 Malcolm Ave. S. E.
MINNEAPOLIS 14, MINNESOTA



Sealite bolts are available with Leklitz Nut #2 (shown), or std. sq. and hex. nut.

most cutting fluids, and dissolves in water, forming a true solution and not an emulsion. There will be no separation even if the fluid stands for long intervals. Exceptional cooling properties are claimed for the oil when mixed with water, and it can be combined with a very large volume of water to take advantage of the water's high cooling effect.

Oil E is said to resist the rusting of equipment and improve the wetting character of the solution to reduce friction between tool and chip. The mixed solution is almost clear and does not leave any oily or greasy deposit when splashed on clothing. It does not froth, foam, or form hard-to-clean sludge. Chips and grinding grits settle out rapidly so that they are not recirculated through the pump and cooling system. For lathes and other such machines, a mixture of 30 parts of water to one of Dromus Oil E is recommended. Grinding is done with a mixture of 70 to one. *Shell Oil Company, 50 W. 50th street, New York 20.*

mit rotation in either direction. The jaws are set flush with the face of the chuck to prevent injuries and to enable threading up to the face.

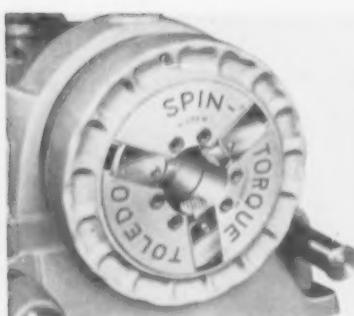
The chuck is said to combine strength with light weight. It clamps rod or bolt stock from $\frac{1}{4}$ -in. up, and pipe or conduit from $\frac{1}{8}$ -in. to 2-in. A special interlock feature of the jaws makes this range possible. *Toledo Pipe Threading Machine Company, 1445 Summit street, Toledo 4, Ohio.*

Ultra Sensitive Current Meter

The TAKK Ultra Sensitive current meter is suitable for measurement of very small leakage currents through insulation at any

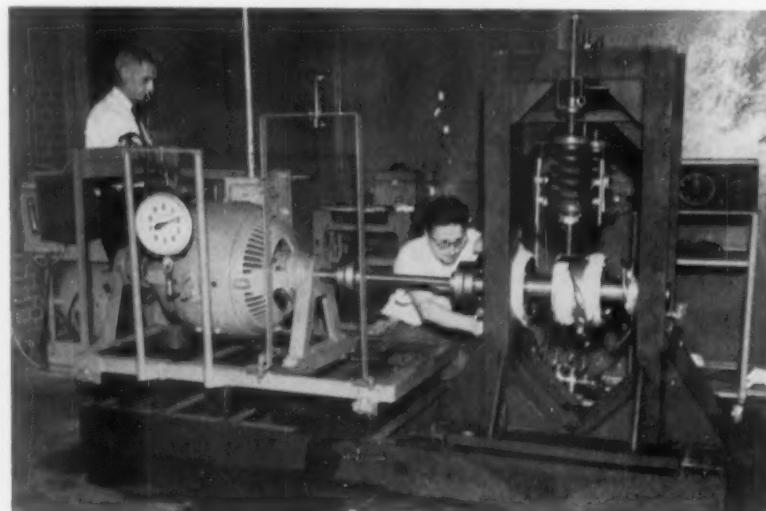
voltage level. It makes possible measurement of d-c currents from 0.001 to 1000 microamperes with an accuracy previously obtained only with the delicate mirror-type suspension galvanometer. With a multiplier resistor, the meter can be used as a very high resistance voltmeter. Resistance measurements up to 150,000,000 megohms can also be taken when used with a suitable voltage source. Electrolysis analyses can be made.

The meter was designed for use with the TAKK high voltage d-c insulation test sets but can be used with any high voltage d-c power supply. The meter is $9 \times 6 \times 5\frac{1}{2}$ in., is ruggedly built, and weighs 8 lb. Its accuracy is claimed to be within plus or minus four per cent when measuring leakage currents. *Heuson Company, 443 Broadway, Newark 2, N. J.*



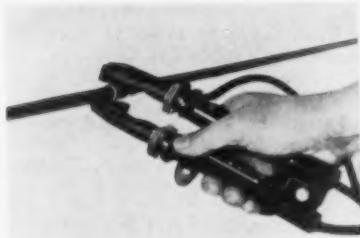
Chuck

Rocking-wedge jaws which tighten as torque is applied are a feature of the Spin-Torque chuck. A spin of the large hand wheel closes the jaws quickly and smoothly. The jaws pull up tight under normal hand pressure and no hammering is necessary. Diagonal serrations on the jaws eliminate end-thrust slippage and per-



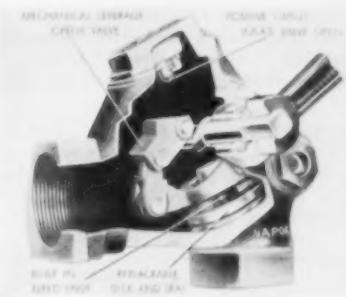
A SIGNIFICANT REDUCTION in occurrence of hot boxes may result from a \$275,000 research study recently completed by Armour Research Foundation of Illinois Institute of Technology, at Chicago. Here, two foundation engineers operate a special ex-

perimental assembly devised for the hot-box project to study freight car journal bearings. Possible causes of bearing failure due to load, speed, and the condition of the lubrication used were observed during the investigation.



Pliers Soldering Tool

The soldering of copper tubing, and the soldering of heavy wire and cable in repair and installation work can be done with this 1000-watt all-electric soldering tool. It is equipped with 10-ft leads and the heat control is a push button in the pliers handle. It is claimed that the tool will solder sweat fittings up to 1 1/4-in. size. *Wassco Electric Products Corporation, Joliet, Ill.*



Easy-Closing Steam Line Valve

A steam end valve has been designed with an easy-opening feature for passenger cars and diesel locomotives to control high-pressure train line steam.

A mechanical linkage inside the valve multiplies the lever pressure for opening against the 250-lb steam pressure that can be in the line. The valve opens slowly at first, to crack it open, then increasingly faster to a full open position. The stem rotates approximately 103 deg from closed to full open.

A positive stainless steel spring-catch locks the valve in the open position so that it doesn't vibrate closed during a trip and shut off the steam. The button on the spring catch fits into the groove on the horizontal surface in the illustration. The pressure of the spring prevents road shock from moving the linkage, and hence closing the valve. At the same time, the groove is of a small enough angle that a moderate pressure on the handle can close the valve when this is desired.

The replaceable disc and the replaceable seat are made of stainless steel, with the former heat-treated. A bleed valve—also stainless steel—is built right into the disc. The bleed valve allows the small amount of steam to bleed out of the end of the last car in the train which is necessary

for proper functioning of the steam heating system. A spring loaded packing on the stem automatically compensates for wear without adjustment.

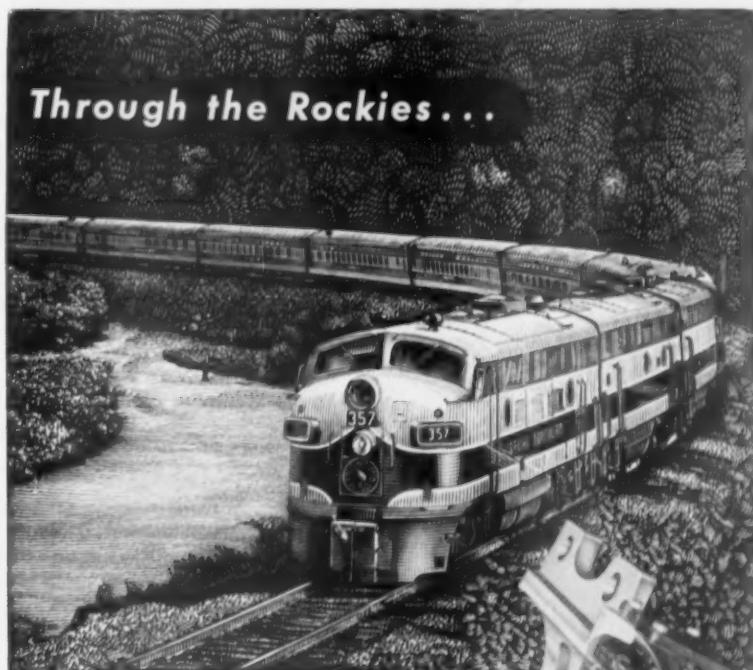
There is also a kit of the interior parts of this new end valve that can be installed in older 2 1/2 in. end valve bodies which will give the rebuilt valves the advantages of the new, easier-to-open valve. *The Vapor Heating Corporation, 80 East Jackson, Chicago 4.*

tains neither carbon tetrachloride nor any of the chlorinated solvents, and is said to be non-explosive and non-flammable.

The manufacturer states that Turco-Solv effectively removes grease, oil and carbon film from brush holders, insulators, commutators, string bands and coils of motors and generators. It evaporates quickly and is non-conductive, which may permit the cleaning of hot equipment. When dry, there is no residue to loosen insulating paint, or pick up carbon dust and metallic particles. No after-neutralization is required. In addition to electrical cleaning, Turco-Solv can be used for mechanical cleaning jobs. *Turco Products, Inc., 6135 South Central Avenue, Los Angeles 1.*

Solvent

Turco-Solv, designed primarily for the cleaning of electrical equipment, is composed of solvents of low toxicity. It con-

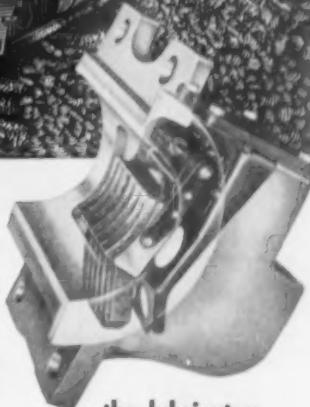


FELPAX Lubricators help keep the "Empire Builder" on schedule

From the first turn of the wheels in Chicago, through the rugged Rockies to Seattle and back again, the suspension bearings on G.N.'s "Empire Builder" get full, continuous lubrication with modern FELPAX LUBRICATORS! Special felt wicks, that last thousands of miles, eliminate waste grubs and starved bearings caused by old fashioned yarn packing.

*You can solve your suspension bearing lubrication problems, too, with FELPAX LUBRICATORS.

For full information on Modern FELPAX Lubricators see your locomotive builder or write to:



the lubricator
that eliminates
repacking



MILLER FELPAX CORPORATION
WINONA, MINNESOTA

FOR SUPERIOR RESISTANCE to ABRASION and CORROSION

Specify
STRATOFLEX
FLEXIBLE
HOSE N° 225

Built to give long service where conditions are especially rough on hose lines. Reinforced with high tensile strength wire braid with outer cover of tough synthetic rubber. In bulk Hose or Hose assemblies with Stratoflex "over the cover" detachable, re-usable fittings. Write for your FREE catalog or order through your dealer.

- ★ Hose Assemblies
- ★ Re-usable Hose Fittings

Dealership Available
in Some Areas

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Branch Plants—Los Angeles and Toronto
Sales Offices—Atlanta, Chicago, Dayton,
Houston, Kansas City, Los Angeles, Portland,
New York, Toronto, Tulsa

PERSONAL MENTION

(Continued from page 9)

Pennsylvania

Eastern Region

J. M. MCGUIGAN, assistant engineer of motive power, office of electrical engineer, Philadelphia, appointed assistant master mechanic, Philadelphia division.

Western Region

STEPHEN NAGY, general car inspector at Chicago, appointed chief car inspector, office of general superintendent of motive power.

J. E. KEEGAN, chief car inspector, office of general superintendent of motive power, retired.

Seaboard Air Line

W. R. LAWRENCE, appointed supervising electrician, at Raleigh, N. C.

Southern

FRANK E. STUBBS, appointed superintendent motor shop, Atlanta, Ga. Formerly assistant diesel superintendent, Washington, D. C.

Waterloo, Cedar Falls & Northern

W. G. LAMB, master mechanic at Waterloo, Iowa, retired.

H. L. CALLIES, shop foreman, appointed master mechanic at Waterloo, Iowa.

Obituary

O. F. HARK, assistant general superintendent motive power—personnel, died on Monday, May 30.

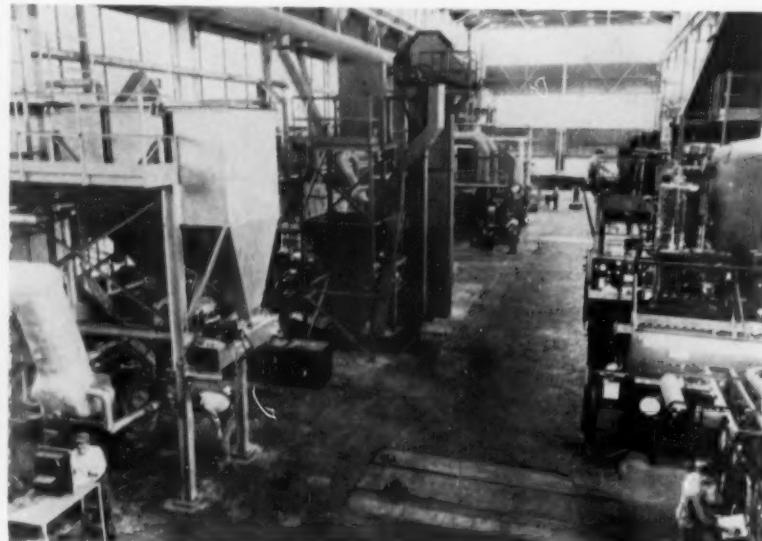
SUPPLY TRADE NOTES

SAFETY CAR HEATING & LIGHTING CO.—Safety has acquired the *Automatic Temperature Control Company*. ATC will continue operations at Philadelphia as a wholly owned subsidiary of Safety.

GREAT LAKES STEEL CORPORATION.—Harry D. Fenske has resigned as vice-president—transportation and general man-

ager, Steel Floor division. Mr. Fenske, the inventor of Nailable Steel flooring, had been in charge of its promotion and sale.

WESTINGHOUSE ELECTRIC CORPORATION.—Chris H. Barlett, manager of the manufacturing and repair division, has been elected vice-president in charge of that division, at Pittsburgh.



The Babcock & Wilcox Company, builder of the boiler for the Norfolk & Western's steam turbine-electric locomotive, "Jawn Henry," is conducting investigations in power production and allied fields at its research center, Alliance, Ohio. Both high pressure water-cooled and liquid-cooled atomic reactor systems are under study, and a new gasketed closure for atomic pressure vessels to replace the solid welds now used to prevent radioactive leakage is under development. Other important

B&W research activities include developments of high-temperature and high-pressure alloys, submerged arc welding at speeds five times as fast as comparable welding methods, steam generators operating at above-critical pressures and temperatures, 4,500 psi and 1,150 deg F, respectively, and investigations in the burning of low-grade fuels. Illustrated is the part of the research center where pilot power plants are operating under simulated service conditions.



D. R. Carse

PULLMAN-STANDARD CAR MANUFACTURING COMPANY.—*D. R. Carse*, assistant vice-president, has been elected vice-president, sales. Mr. Carse will continue in charge of the New York office.

ALAN WOOD STEEL COMPANY.—*Harleston R. Wood* has been elected president and chief executive officer, effective August 1, succeeding *John T. Whiting*. Mr. Wood was previously vice-president in charge of planning and development.

UNION CARBIDE & CARBON CORP., ELECTRO METALLURGICAL COMPANY.—*Arthur R. Lytle* has been appointed vice-president in charge of research.

WESTINGHOUSE ELECTRIC CORPORATION.—*Chris H. Bartlett*, has been elected vice-president in charge of manufacturing and repair division at Pittsburgh. *Charles C. Shutt*, head of small motor division at Lima, Ohio, also elected a vice-president.

KERITE COMPANY.—*Kerite* has appointed *Robert A. Young* as Pacific coast manager, to supervise its sales and engineering in that territory. Mr. Young will continue to operate his own established business in electrical power sales and engineering on the West Coast.

NATIONAL PNEUMATIC COMPANY, HOLZER-CABOT DIVISIONS.—*Richard H. Frost* and *J. J. Anderson* have been appointed president and vice-president and general sales manager, respectively, of National Pneumatic and Holzer-Cabot.

CUMMINS ENGINE COMPANY.—*Paul J. Every* has been named assistant general sales manager.

INTERNATIONAL NICKEL COMPANY.—*M. D. Beware* has become a member of the Welding Group of the Development and Research Division's Technical Service Section. *Eugene H. Kinelski* and *Leon M. Petryck* have been appointed research metallurgists in the Welding Section of the Research Laboratory at Bayonne, N. J.



Douglas Grymes, Jr.

KOPPERS COMPANY, WOOD PRESERVING DIVISION.—*Douglas Grymes, Jr.*, has been appointed a vice-president. Mr. Grymes will retain the duties of division sales manager, which he assumed in 1953.

VANADIUM CORPORATION OF AMERICA.—*John J. Green*, formerly with Universal-Cyclops Steel Corporation, has been appointed service engineer in the Pittsburgh office of Vanadium.

THE BUDD COMPANY, on July 1, will assume ownership and management of a wholly owned subsidiary company: Continental-Diamond Fibre Division of The Budd Company, Inc. The new subsidiary was created by the purchase of plants from the Continental-Diamond Fibre Company at Newark, Del.; Bridgeport, Pa.; Valparaiso, Ind., and Spartanburg, S. C., and subsidiaries in Canada and France. These plants are engaged in the production of laminated plastics for industrial use and insulating tapes. Included is a full line of railway track insulation. The name of the old Continental-Diamond Fibre Company will be changed to the Haye Company which will continue to own and operate a plant at Marshallton, Del., and a British subsidiary, engaged in the manufacture of plastics used in the chemical industry.

BALDWIN-LIMA-HAMILTON CORPORATION.—*McClure Kelley* has been elected president, succeeding *Marvin W. Smith* who continues as an executive officer of the company, with special duties and responsibilities. *Robert G. Tabor* and *Arthur Clements* have been elected vice-presidents of the Hamilton (Ohio) division.

BRODERICK & BASCOM ROPE CO.—*Joseph H. Bascom*, executive vice-president and treasurer, has been elected president, succeeding *C. E. Bascom*, elected chairman of the board.

**FIRST TRULY PORTABLE
200 AMP. ARC WELDER**

**Weighs only 65 lbs.; carry it to the job!
Using the first TOROIDAL transformer!**

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TRADE MARK
MODEL 200 AW

**OBSOLESSES ALL OTHER
WELDERS OF COMPARABLE RATING!**

Employing the first toroidal transformer ever used in arc welders, the portable Bren-Weld does the work of conventional welders 4 to 5 times its size and weight. Eliminates the necessity to transport bulky equipment or heavy parts to be welded. Now you can carry Bren-Weld to the job!

Bren-Weld handles electrodes from 3/64" through 5/32"; it has adjustable arc voltage for various arc characteristics.

Because it is so flexible in operation and application, Bren-Weld is ideal for plant production and maintenance, for construction work, for railroads, on the farm and in home workshop.

24 HOUR DELIVERY FROM STOCK!

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- 200 Amp.—At 50% Duty Cycle
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- 110/220 Volts A.C., 50/60 Cycles
- Also Available For 220/440 Volts
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11" x 12" x 7 1/2"
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(F.O.B., L. I. CITY, N. Y.)
Lowest Price On Market
For Comparable Ampere Rating

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What is your cost of diesel traction motor commutator reconditioning? In labor? In time out for service?

This cost, of course, varies greatly on different railroads. But it can be greatly minimized by the proper choice of a traction brush grade.

Stackpole Carbon Company diesel traction brush engineering is aimed first of all at good commutation and stable filming qualities under the most adverse conditions. Records of many users prove the ability of Stackpole brushes to keep commutators in service for exceptionally long periods. In some particularly difficult types of service, Stackpole brushes have actually improved poor commutator conditions that developed when other makes of brushes were used. The records show that this has been accomplished with entirely adequate brush life.

STACKPOLE diesel-electric BRUSHES

BRUSHES FOR ALL ROTATING ELECTRICAL EQUIPMENT • BEARING MATERIALS
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RAIL BONDING MOLDS • RESISTANCE WELDING AND BRAZING TIPS • SEAL
RINGS • TROLLEY AND PANTOGRAPH SHOES... and dozens of carbon-graphite specialties.

STACKPOLE CARBON COMPANY, St. Marys, Pa.



S. M. Felton

ACF INDUSTRIES, INC., AMERICAN CAR & FOUNDRY DIVISION.—Samuel M. Felton has been appointed president.

Mr. Felton, who has been president of the Shippers' Car Line Corporation, an ACF subsidiary, since October 1950, was president of the American Railway Car Institute for five years prior to joining ACF. For ten years he was general sales manager of the Railway Division of the Budd Co.

J. A. ZELLE COMPANY.—The Zelle Company, Bridgeport, Conn., has acquired the railway assets of the *Barnaby Manufacturing Company*, including dies, tools, patterns, drawings and inventory.

ELECTRIC STORAGE BATTERY COMPANY.—Edward A. Holland, industrial sales engineer, has been appointed assistant manager New York sales branch.

U.S. INDUSTRIES, INC., AXELSON MANUFACTURING COMPANY DIVISION.—Edward D. Jackson has been appointed general sales manager, with headquarters in Los Angeles.

AMERICAN BRAKE SHOE COMPANY.—American Brake Shoe has purchased the *Denison Engineering Company*, Columbus, Ohio, manufacturers of hydraulic presses, pumps, and automatic controls. The company will continue to operate under its own name, with W. C. Denison continuing as president and chief executive officer.

CRANE COMPANY.—Frank F. Elliott, senior vice-president of sales, has been elected president and chief executive officer, succeeding John L. Holloway, who has resigned because of ill health.

C & D BATTERIES, INC.—Operations have begun at the new C & D plant at Attica, Ind.

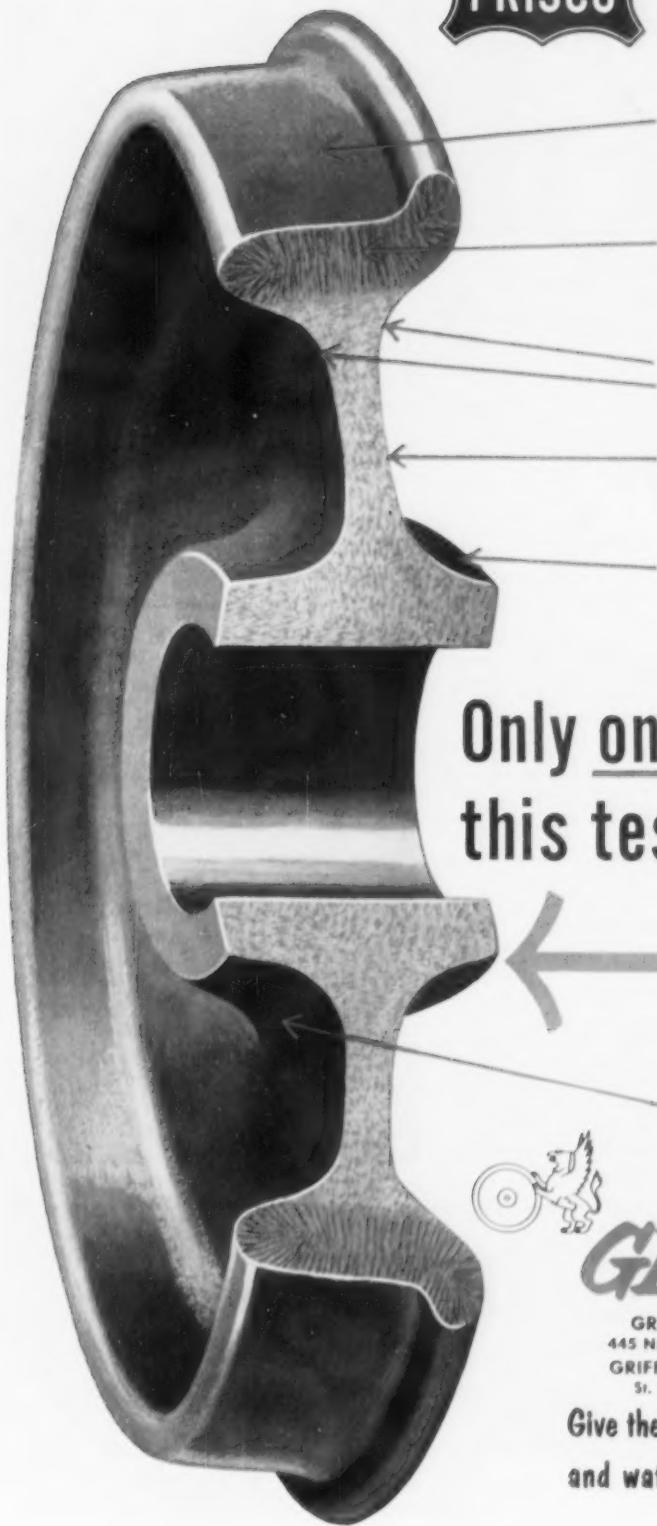
INTERNATIONAL EQUIPMENT COMPANY.—H. W. Wreford has been assigned full charge of Ontario operations, with jurisdiction over sales, service and administration of Toronto and Hamilton branches.

NEW YORK AIR BRAKE COMPANY.—Edward D. Higgins, has been appointed assistant to director of engineering. He was formerly with Eclipse Pioneer division, Bendix Aviation.

(*STN's* continued on page 95)



The Frisco is one of the progressive railroads now testing the Griffin EQS.



Roundness of EQS wheel is practically perfect—as-cast. No machining necessary . . . the toughest and longest-wearing metal is *on the tread, NOT in the scrap bin.*

Pressure pouring in graphite molds results in superior flange and tread wear. Note the directional solidification in flange and tread, shown before heat treatment: *the grain of the metal in EQS wheels is at right angles to the point of wear.*

Long sweeping fillets under flange and rim of EQS wheels insure greatest possible strength.

The Griffin EQS plate is of *uniform thickness*, dimensionally accurate in any section.

Now made of .75 carbon steel. Exclusive casting process used in producing EQS wheels permits use of recognized steel analysis that will best meet your requirements.

Only one wheel can pass
this test with a score of

100

Location of hub and plate is identical in all EQS wheels; dissipation of heat is even, without developing internal stress.



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ELECTRIC QUALITY STEEL

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Give the "green" to GRiffin...
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- Perfectly mated bearing halves
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for Diesel Locomotives

High Mileage

traction motor support bearings

for **LONGER ROAD LIFE**

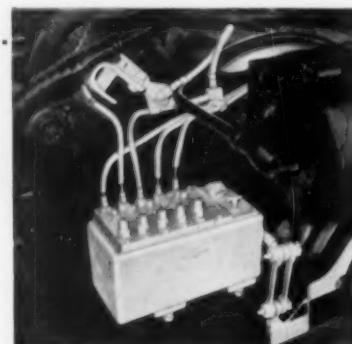
The extra precision that goes into Magnus traction motor support bearings pays off in longer, trouble-free mileage on the road. Quality control of metal mixes, high precision boring and final testing of mated bearing halves *under load* assure an extra margin of dependability — you can't buy a better bearing.

These Magnus HIGH-MILEAGE bearings are available for replacement on all types and makes of diesel-electric and electric locomotives and MU cars. For the complete facts, get your free copy of Bulletin No. 6000.

D-16 FLANGE LUBRICATOR increases mileage between wheel turnings up to 40%

This new, *more positive* method of flange lubrication not only gives greatly extended wheel life, but substantially reduces shop costs, too. Oil pressure to each flange is positively controlled by six individually adjustable pumps that are gang-operated

from a common linkage to the truck frame. Unit operates only when locomotive is moving. Can be used to lubricate center pin wear plate also, if desired. Full 16-pint capacity for extra mileage between refills. Write for complete information.



MAGNUS 391 SAFETY VALVE for dependable overload protection on diesel locomotive steam generators

This high-precision safety valve is specially made for railroad service on diesel locomotive steam generators. Opening and blowdown pressure adjustments are easily accessible and self-locking. Flexible metallic bellows prevent escape of steam into the generator compartment. Write for full details.

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F. U. Hayes



H. E. Neale



Dr. J. E. Stareck



H. D. McLeese

BULLARD COMPANY.—*Frank U. Hayes*, a vice-president, has been appointed assistant general manager, and *H. Edward Neale* has been appointed sales manager.

Mr. Hayes was appointed sales manager in July 1947 and elected a vice-president in March 1951.

Mr. Neale was assigned to the sales department, New York State in 1947; to the Chicago territory in 1949, and in 1951 was appointed assistant sales manager.

KOPP GLASS, INC.—*Willard A. Provost*, eastern sales manager, has been appointed assistant sales manager, at Swissvale, Pa.

METAL & THERMIT CORPORATION.—*Dr. J. E. Stareck* appointed director of research, continuing also to direct research activities of United Chromium, Inc., a subsidiary. *H. D. McLeese* has been appointed general sales manager, directing sales also of United Chromium, of which he has been vice-president and general sales manager.

WORTHINGTON CORPORATION.—*Hermann Walter* has been appointed director of research at Harrison, N. J., succeeding *Ralph M. Watson*, resigned. *Robert S. Sherwood* has been appointed assistant director of research.

The Plainfield, N. J., (Welding Equipment Division) of Worthington has been

appointed exclusive national distributors for the line of welding controls manufactured by the Mullenbach Division of the *Electric Machinery Manufacturing Company*, which are now known as Worthington-Mullenbach controls.

Obituary

ROBERT JAY SHOEMAKER, engineering consultant, Magnus Metal Division, National Lead Company, Chicago, died on Wednesday, May 25.

GUSTAF A. LILLIEQVIST, research director for American Steel Foundries, Chicago, died suddenly on May 31.

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Works in seconds!

Loosens Rusted Bolts
nuts . . . screws . . . parts



LIQUID WRENCH

A powerful blend of quick-acting solvents that frees "frozen" parts without breakage. Safe for all metals and alloys.

Makes joints
LEAKPROOF!

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Makes all assemblies
leakproof and pressure-tight. Easy to apply with
brush-in-handle.

- NON-SOLVENT—WILL NOT HARDEN
- WILL NOT SHRINK, CRACK OR CRUMBLE
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FREE
sample

Two of the many famous SOLDER SEAL
products available from your Automobile,
Plumbing or Hardware wholesaler.

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Special Railroad Mount FLEXIBLE SHAFT GRINDERS



Designed
for RR
Shop Use



For grinding, sanding, rotary filing, wire brushing, drilling, deburring or polishing. With this new Railroad Mount, you take the Strandflex machine right to the work. You'll find it invaluable for a variety of different jobs in diesel shops, car shops. Promotes efficiency; workers lift only the tool—not the heavy motor.

Also Gasoline Powered Unit for Bridge or Maintenance of Way Depts.

All-purpose compact 5 hp. gasoline engine powered STRAND Flexible Shaft machine, governor controlled operating speeds from 2200 to 3200 rpm. Ideal for grinding rail welds, wire brushing before painting, smoothing concrete, etc. Makes you independent of electric power and air compressors.

Write for details on STRAND Flexible Shaft Machines
specially designed for railroad use.

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**there is a difference
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Good pipe tools mean longer service life and greater satisfaction on every job. Toledo unconditionally guarantees every pipe wrench it makes . . . your assurance of maximum service at lowest cost. Single spring action gives quicker, easier setting on pipe surfaces. Replaceable jaws in every size from 6" to 48". Your supplier knows and stocks Toledo pipe wrenches, pipe cutters, pipe threaders and power machines. Next time try Toledo.

THE TOLEDO PIPE THREADING MACHINE CO.
TOLEDO 4, OHIO

BUILDERS OF THE WORLD'S FINEST PIPE TOOLS
TOLEDO
PIPE THREADERS • PIPE WRENCHES • PIPE MACHINES

Charm your hose



with PUNCH-LOK Hose Clamps



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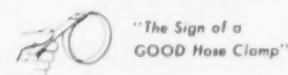


Wrapped Insulation
on Piping and Tubing



Tank Hose

Punch-Lok hose clamps are ideal for use on all types of shop hose—for repairs or for original installations. They are widely used by makers of diesel engines in new construction and for engine overhaul jobs. Punch-Lok hose clamps have a well earned reputation for safety and dependability.



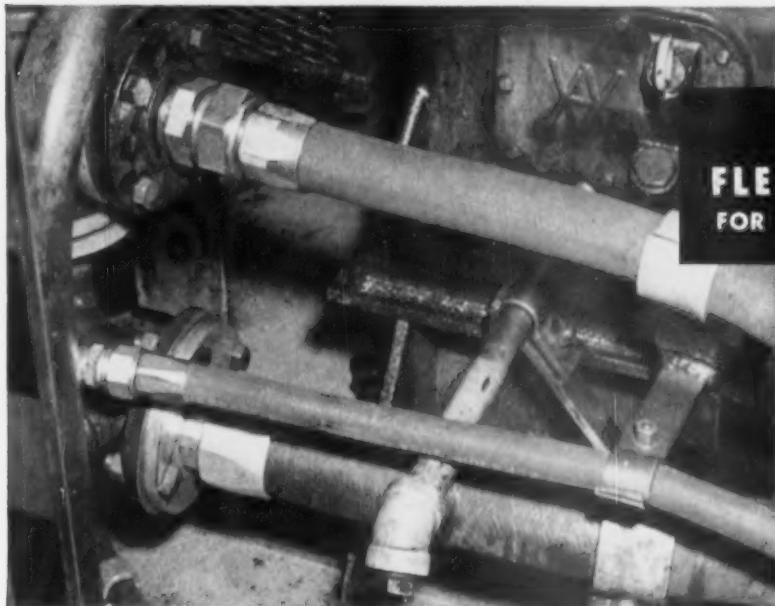
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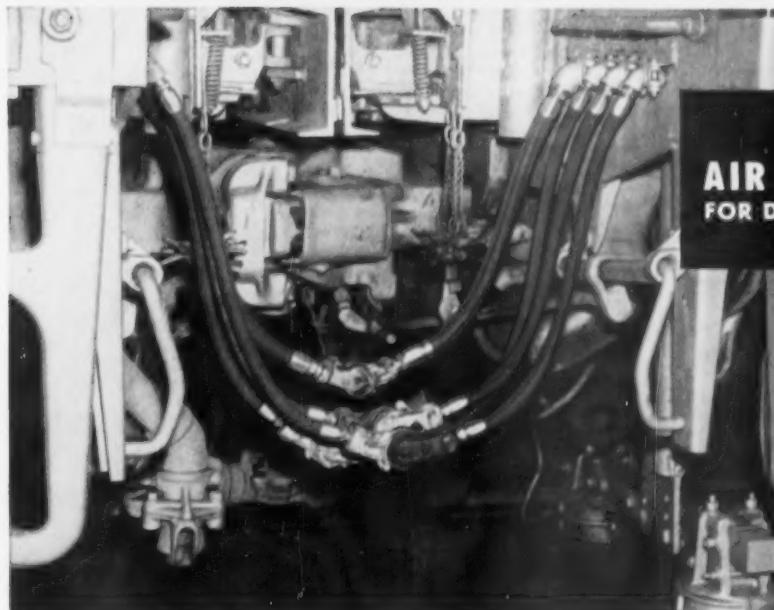
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AEROQUIP FLEXIBLE HOSE LINES FOR FUEL, LUBE OIL AND WATER



Widely used to replace rigid tubing on diesel locomotive fuel, lube oil, water and air lines because Aeroquip hose lines withstand vibration and extreme heat. Complete assemblies are easy to make by cutting bulk hose to length and attaching the fittings. And they are easy to install, even in confined areas. Sizes range from $\frac{1}{4}$ " to 3".



AEROQUIP AIR BRAKE HOSE LINES FOR DIESEL-ELECTRIC LOCOMOTIVES AND PASSENGER CARS



One major railroad will save thousands of dollars a year because Aeroquip air brake hose lines are used for all replacements. Aeroquip fittings are detachable and may be used again and again. Inventory is reduced to a minimum of bulk hose and fittings because replacement lines can be assembled right in the repair shops as needed. Write for complete information.



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RATIOS using
HEAVY
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• Nalco is proud to have the privilege of working with the "Progressive Chesapeake and Ohio Railway" toward the objective of lower operating ratios using heavy fuel oils properly treated with Nalco Fuel Oil Treatments.

In addition to initial cost savings using heavy fuel oils and Nalco Treatment, there are also these added operating advantages: greater fuel efficiency, minimized sludging problems on the locomotive, in storage and fueling facilities.

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THE *Nalco* SYSTEM • Serving Railroads
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THROW YOUR "CRUTCHES" AWAY—

Timken® bearings Cure the Hot Box Problem

*...and they pay for themselves over
and over and over in operating
and maintenance savings*

TIMKEN® tapered roller bearings *cure* the hot box problem because they eliminate the *cause*, the friction bearing itself — unlike devices that merely serve as "crutches" for friction bearings in an attempt to improve their performance. With Timken bearings you can throw your crutches away, and eliminate, too, the frequent lubrication and inspection you now rely on to keep friction bearings sliding.

"CRUTCHES" Besides ending the **REQUIRE COSTLY MAINTENANCE** the *big* advantage of Timken bearings

is the *huge savings* in maintenance and operating costs they effect year after year. "Crutches", like friction bearings themselves, require costly maintenance. By contrast, Timken bearings cut terminal inspection time 90%, reduce the cost of lubricant as much as 89%. When all railroads go "Roller Freight", they'll save \$190 million a year, earn a 22% annual return on the investment.

Timken bearings make all these savings possible because they roll the load instead of sliding it. It's the roller bearing design that eliminates the need for frequent inspection and lubri-

cation. With friction bearings lubrication often fails. And even expensive protective "crutches" don't guarantee it won't.

THE TAPER **DOES IT!** The taper makes Timken the only roller bearing you can count on to deliver the full savings from roller bearings. The rollers can't skew to upset full line contact and shorten bearing life. Can't slide sideways to score rollers and races, pump lubricant through the seals. And for added toughness, Timken bearings are made from nickel-rich Timken fine alloy steel.

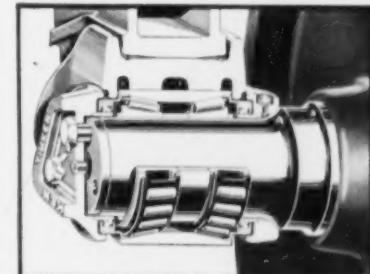
The new heavy-duty Timken bearing assembly has already cut the cost of Timken bearings 18% to 25%. The price difference between friction and Timken bearings is narrowed still further when you add costly protective devices to friction bearings. And a practice recently adopted by one major railroad can shrink it even more.

This road is converting to roller bearings every freight car that comes into the shop for major repairs. It has a practical changeover program under way. And it's in a position to enjoy the economies of continuous, as opposed to spasmodic, shop operation.

OUR SAVINGS MEAN SAVINGS FOR YOU

If more roads were to adopt this practice, it would enable us, too, to operate on a more continuous production schedule. This in turn would effect manufacturing economies we could pass on to you in the form of lower prices.

When you invest to solve your journal bearing problems, make sure you *cure* the hot box problem and cut operating and maintenance costs to the bone. Get Timken tapered roller bearings. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".



Only **TIMKEN®** bearings cure the hot box problem and cut operating and maintenance costs to a minimum